# THE CORNUCOPIA PROJECT

## Food in Minnesota: REGENERATING LOCAL SYSTEMS

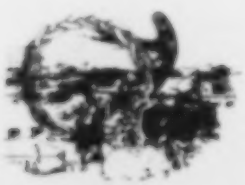
*A Study of the Food System of Minnesota*

BY

Shirley D. Hoffman

AND

The Cornucopia Project of Rodale Press



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## INTRODUCTION

An important indication of the success of the United States food system is the fact that we seldom need to think about the food system at all. The quantity, quality, and variety of foods we want are generally available at our local grocery store and are reasonably priced.

This very success has blinded us to some of the weaknesses and vulnerabilities of the complex system that produces, processes, transports, and sells our food. Unhappily the vast productivity of the United States food system has been bought in part with nonrenewable resources. Fossil fuels are used to power farm machinery, processing plants, the trucks that bring our food to the local grocery store, and the cash register at the check-out counter.

In many regions of the country, crop production has been possible only because farmers were able to mine huge underground water sources. But these aquifers, which took thousands of years to form, are being used so intensively that it's only a matter of years before the wells start to run dry.

The nation's agricultural lands have been mined also. Many modern cropping practices have allowed precious topsoil to be washed away. Microorganisms essential to the soil's continued productivity have been diminished by over-application of agricultural chemicals.

These are just a few of the problems facing the food system of the United States. Not just the concerns of distant researchers and policy makers, they affect every state and every

consumer.

Symptoms of these problems can be observed at the state level. In Minnesota, for example,

* 44 percent of the food the state's residents consume is imported.
* Every year, Minnesota "exports" over one billion dollars to pay for imported food.
* Transportation charges for imported foods cost Minnesota consumers $78 million every year.
* Every year, soil erosion robs Minnesota's agricultural lands of 149 million tons of soil -- enough to bury Minneapolis under two feet of soil.
* Depressed farm prices and soaring production costs put up to a third of Minnesota's farmers in serious financial straits in 1984.

This report is an attempt to put together significant facts about the Minnesota food system, and show to Minnesotans its strengths and weaknesses. By building on our assets and eliminating our vulnerabilities, we can develop a farm and food system that is productive, adaptable, and sustainable. The recommendations featured in this report are designed to provide guidance for state and local governments, farmers, industry, researchers, and consumers who are concerned about making changes in their food system.

## MINNESOTA'S CURRENT FOOD SELF-SUFFICIENCY

After evaluating information about Minnesota's food system - what comes in, what goes out, and its value - the state can attempt to balance production of local commodities, eliminate unnecessary transportation costs, and encourage local processing of commodities.

The food chart (see appendix A) reports data for major commodity groups such as meats, grains, fish, and fruits and vegetables. Minnesota's imports and exports are calculated by comparing consumption with production. This calculation indicates theoretical rather than actual self-sufficiency, since simultaneous exports and imports of single commodities are not reflected in the figures. On the chart, commodities which are sent out of state for processing and returned for consumption are not separated from commodities which never leave the state. Gaps on the chart reflect the paucity of information available on small-scale agricultural production. For example, Minnesota produces small amounts of numerous vegetables for which no data are available. Retail values on the chart have been calculated using average farm prices and the average farm to retail price spreads published by the United States Department of Agriculture. Frequent reference to the chart will allow the reader to understand how generalizations have been made.

Total retail values of production and consumption demonstrate that Minnesota is a net exporter of food. However, Minnesota produces only 56 percent of the food it consumes. This means that the state must still import 44 percent of the food its

residents eat. Many major staple items such as fruit, vegetables, fats and oils, and seafood are not produced in Minnesota, which means that the entire consumption of these foods is imported. Minnesota also imports at least some of many other important commodities such as chicken, veal, and apples.

Although self-sufficiency does not appear to be a major issue in Minnesota, there are several reasons why dependence on imported food should be of concern. Importation raises food costs, which can restrict the amount of food consumers are able to buy. (The annual transportation cost of the state's food imports is $78 million. 1) In some cases, transportation costs can exceed the value of the product.2

Moreover, importing food means exporting dollars. Only about one-third of our food dollars stay with Minnesota's food retailers (grocery stores and restaurants).3 This means that every year, Minnesota exports $1.046 billion to other states and countries. If this money remained in-state, it would find its way to Minnesota's farmers and farmworkers, farm machinery dealers and repair shops, food packing and processing companies, and other food and agriculture related industries, thus helping to strengthen the state's economy.

Finally, the state's agricultural sustainability -- the ability of the land to continue a high level of production -- must be considered. Soil erosion, soil nutrient depletion, pollution of water resources, and overuse of chemical fertilizers may eventually lower the production levels Minnesota now enjoys. This could increase the state's dependence on other states for food. Minnesota has made some progress toward resolving some of

these problems in food self-sufficiency, but further improvement is necessary.

The food import chart reveals much about the strengths and weaknesses in self-sufficiency of Minnesota's food production. The state is more than self-sufficient in meat commodities, exporting 51.8 percent of the meat and poultry it produces. Veal is the only meat that is imported. Over fifty percent of both lamb/mutton and pork is exported, as is thirty percent of the state's beef. Minnesota could easily shift some production from one of the exported meats to veal production, since input requirements are similar.

With the exception of broiler chickens, poultry is also an exported commodity. One half of Minnesota's eggs and almost 90 percent of all broilers are imported. Input requirements are similar for broilers and turkeys or layers, so there is no inherent need to import broilers. Some resources currently used for exporting turkey and eggs could be shifted to broiler production. Highly regionalized production in broilers (with huge operations supplying birds for large areas) and vertical integration of the poultry business may explain why Minnesota currently imports broilers.[4]

Some of these resources could be directed toward the production of commodities which are now imported. Decreasing meat production also would directly affect the state's grain production. With less land in feed grain production, more acreage would be available for growing commodities such as vegetables or fruits. Minnesota needs some agricultural exports

to balance food imported because of climate; however, meat would not be the best choice because of high transport costs and perishability.

Dairy products are another important commodity for Minnesota. Milk production greatly exceeds the state's consumption. The only imported dairy product is ice milk -- a fact that probably reflects the type of equipment in the state's dairy processing facilities.

Saltwater fish products necessarily will always be imported. An examination of the potential for increased sustainable production of freshwater fish should be made, however. Aquaculture production of commercial freshwater fish also could decrease fish imports.

Grain is Minnesota's most valuable export, providing income that helps balance the cost of importing commodities such as coffee, citrus fruits, cocoa, etc. A large percentage of the grain produced in Minnesota feeds livestock, which in turn yields meat and dairy products for the state's population. With grain crops grown on approximately 75 percent of farmland in Minnesota, huge amounts of grain are exported from the state every year. Current grain surpluses and low grain prices should provide strong incentives to use larger amounts of cropland for other products which the state imports.

Vegetables are a strong candidate, for only 22 percent of all the kinds of vegetable items consumed in the state are grown in any significant amount. In fact, Minnesota imports almost all the vegetables it uses except those that are processed, such as potatoes, peas, sweet corn, pumpkin/squash, and dried beans.

Home gardens and small truck farms contribute relatively small amounts of fresh food to the state's diet.

Nevertheless, Minnesota has the climate and resources to become completely self-sufficient in almost all vegetables it consumes. The most practical method to improve vegetable production is the encouragement of small-scale vegetable farms. (Labor inputs are much higher for vegetables than for grains, so large-scale production may be unprofitable.5) Increased production would require more processing facilities so Minnesota vegetables could be available year-round in canned, frozen, or dried form. Smaller, less perfect-looking local produce would be quite acceptable after such processing.

Many vegetables and fruits such as carrots, cabbage, squash, pumpkins, apples, etc. can be kept in cold storage throughout the winter. In addition, there are a great many cold-tolerant varieties of vegetables which can be grown throughout the winter months in greenhouses. Oriental vegetables and greens have been shown to grow best in temperatures of 40-60oF and can virtually eliminate the need for lettuce to be shipped in from California in even the coldest months.6 Consumer education is necessary to explain the true cost of imported, fresh produce in winter in terms of water resource usage, transportation expenses, and energy usage. Promotion and education regarding new vegetable varieties should coincide with this type of educational thrust.

Complete self-sufficiency in fruit production is not possible in Minnesota, for oranges, bananas, pineapple, and grapefruit cannot survive in our northern climate. However,

priority should be given to importing fruit from nearby states to minimize transportation costs. For example, Illinois and Missouri, instead of Florida or California, could supply Minnesota with pears, grapes, and peaches. Fruits such as apples, grapes, and strawberries can be grown in Minnesota and local production of these commodities should be encouraged although their size and appearance may not be as impressive as those of fruits from California or Texas.

Small-scale fruit and vegetable farming should be encouraged by means of advice and assistance to those who wish to start production, along with financial assistance to make the transition to horticultural production. Programs to organize labor pools for the hand labor necessary in horticultural farming would also encourage local production. Improved marketing systems would assist the farmer in quick and efficient sale of the product.

Self-sufficiency in regard to "miscellaneous" foods and fats and oils can also be improved. The substitution of beet sugar for cane sugar could reduce the need for importing sugar. These types of sugar are almost the same so consumers would not need to make major adjustments. Minnesota is an exporter of honey so increased local consumption would not require major changes in honey production. More maple and other syrups could be produced in the state. Several varieties of nuts such as hazelnuts and some types of walnuts could be cultivated in Minnesota. In-state processing facilities are also needed to process and refine syrups, sugars, fats, and oils.[7] Local production of syrups, sugars, fats, and oils will increase as

transportation costs rise.

WHAT'S BEING DONE

A trend toward food self-sufficiency has begun in Minnesota. Small advances in relevant legislation can be observed, although no laws dealing directly with food self-sufficiency have been passed (see appendix C). Some statutes indirectly improve Minnesota's food self-sufficiency through preservation of agricultural land, promotion of state agricultural products, and the promotion of producer and consumer co-ops. Other statutes discourage self-sufficiency by expanding out-of-state commodity exports encouraging specialization in a few crops such as dairy products, wheat, or beef cattle. Overall, Minnesota does not have a distinct policy of self-sufficiency in food production. The "Buy Minnesota" law (Chapter 336, passed June 14, 1983) requires state agencies and colleges to give preferential treatment to Minnesota companies and agricultural producers in contract agreements. But it may have done more harm than good because several states have decided to retaliate and boycott certain Minnesota companies.8

The State Department of Agriculture, acting on its legal mandate to promote and assist Minnesota agriculture, has encouraged food self-sufficiency by setting up farmers' markets in urban areas where small farmers can sell their produce. The Department of Agriculture promotion of Minnesota-grown produce involves 30 to 100 billboards, bus placards, and bumper stickers using the slogan "2,000 miles fresher - Minnesota-grown."9 The department has also published a directory of "pick-your-own"

locations near the Twin Cities Metropolitan Area to encourage urban dwellers to buy locally grown produce. The mayor of St. Paul, George Latimer, is dedicated to promoting homegrown produce. He has backed the establishment of a new Farmers' Market which has locations throughout the city. Another of his projects to promote Minnesota produce is educating Hmong refugee families on growing and marketing vegetable crops.[10]

Federal and local laws affect food self-sufficiency indirectly by regulating farming practices -- primarily those causing soil erosion and pollution. The federal water pollution act of 1972 requires state and local agencies to implement management provisions for pollution, which includes soil erosion.[11] Minnesota has not enacted any specific soil erosion regulations, but has instigated a system of voluntary cooperation. The state law merely sets up a pollution agency and allocates funding. The agency determines high priority erosion control areas, but farmers are not legally required to use erosion control practices.[12]

Several strict <u>local</u> erosion control laws do exist in Minnesota. Benton County has a mandatory wind erosion control ordinance.[13] Since 1971, Steele County has required subdivisions' developers to submit plans that include erosion control measures.[14] The Nine Mile Creek Watershed District in metropolitan Hennepin County requires permits for any earth changes that could add sediment to any stream within the district.[15] These laws demonstrate the need for a comprehensive policy on the state's food supply. Some statutes contradict others in concepts and priorities, and local governments have no

guiding policy on which to base their ordinances. A comprehensive policy can, through legislation, move the state toward greater food self-sufficiency.

Consumers have become concerned about the self-sufficiency and sustainability of their food supply. Consumer action groups have formed, and for many people, food buying preferences have changed. Retail and wholesale cooperatives have become more popular. Their policy is to provide the cheapest, freshest, most nutritious food possible and to attempt to buy locally produced food whenever possible. Highly processed foods with chemical additives are avoided by co-ops because of their higher cost and lower quality.[16]

Other consumer and producer organizations also are concerned with various aspects of food self-sufficiency in Minnesota (see appendix B). The Organic Growers and Buyers Association (OGBA) promotes locally produced food and helps organic farmers market their products. The St. Paul Food Resources Project is examining ways to improve the food self-sufficiency of the city by promoting the use of Minnesota products as much as possible.[17] Twin City metropolitan governments have joined the state department of agriculture in encouraging consumption of locally produced food and helping local farmers market their produce. Additional groups are focusing on consumer education, land and land use issues, home gardening, winter production of fresh produce, soil and water conservation, and pollution control measures. As more people in Minnesota become aware of and concerned about the issue of food self-sufficiency, major changes

can be made.

## SOIL EROSION

Soil erosion is a major concern for Minnesota farmers. According to preliminary figures from the National Resources Inventory, Minnesota's cropland is losing an average of 2.5 tons of soil per acre per year due to water erosion, and 3.9 tons per acre because of wind erosion, for a total soil loss of 6.4 tons per acre per year.[18] The level of erosion that most soils are able to tolerate is generally estimated to be about three tons per acre per year.

All told, wind and water erosion is robbing Minnesota's agricultural land of 149,452,700 tons of soil every year. This is enough soil to bury the city of Minneapolis under two feet. Over half of Minnesota's cropland (12.8 million acres) is losing topsoil faster than it can be replaced by nature. The Soil Conservation Service has estimated that 58 percent of Minnesota's cropland needs erosion control.[19]

Techniques such as installing windbreaks, strip cropping, minimum tillage, and planting cover crops are good control practices in the flat prairies of western Minnesota where wind erosion rates reach eight tons per acre, and some farmers are using these practices to control erosion. In other areas of the state where water erosion is a major concern, techniques such as terracing, contouring, and mulching are being used by some farmers.[20]

Since farmers outside Benton, Steele, and Hennepin counties are not required to use erosion control techniques, soil losses

from erosion are still high in Minnesota.[21] The soil conservation branch of the State Department of Agriculture should be given the authority to require soil erosion control practices, especially in areas severely affected by this problem.

FERTILIZERS

At present, chemical fertilizers are a necessary component of Minnesota's agriculture. With a consumption of 2.13 million tons of fertilizer in 1982 -- about 1,000 pounds per resident -- Minnesota ranks seventh in the country in fertilizer consumption.[22] Manufacturing of fertilizers consumes 38 percent of the energy used in agriculture in Minnesota.[23] Since 1977, fertilizer prices have increased up to 36 percent, contributing to cost increases in farmers' production expenses.

In a regenerative farming system, use of chemical fertilizers (which are often imported from other states) is reduced by the use of organic fertilizers and diversified cropping systems. Research has been done on the value of swine manure for fertilization and the best methods of application.[24] The biggest problem with using any manure, including swine manure, is the low amount in the manure of certain nutrients most needed in the soil, and the need for quick application before valuable nitrogen is lost.[25] Manure is, however, a valuable fertilizer and also helps ease the problem of waste disposal. The use of sewage sludge as a fertilizer has also been studied and a limited number of farmers use it on their fields.[26] A major problem with sewage sludge is the small amounts of heavy metals it contains. These heavy metals are toxic to humans and can build up in the soil, so the Minnesota Pollution Control

Agency controls the use of the sludge.[27]

Other sustainable ways of organic fertilizing include crop rotation, intercropping, the use of crop residues, and the planting of legumes which add needed nitrogen to the soil. The cost of starting pollution control measures can be high, so state and federal governments give tax incentives to farmers who absorb the startup costs on pollution control measures. These include a ten percent income tax credit for feedlot pollution control equipment and facilities, real estate tax exemptions on property used for pollution control, and federal investment tax credits of up to ten percent on most pollution control equipment. These tax credits and accelerated depreciation provide incentives to use pollution control practices.[28]

PESTICIDES

The use of synthetic organic chemical pesticides is a fairly recent trend in American agriculture. The first of these chemical pesticides, DDT, is no longer in use. However, there is a continually expanding range of pesticides available to farmers to fight weeds, insects, and plant diseases.

In 1982, Minnesota farmers used pesticides at least once on 96 percent of their soybean acreage, on 95 percent of both corn and sugar beet acreages, on 89 percent of sunflower acreage, and on 87 percent of wheat acreage. These five crops make up 69 percent of all planted acreages, but accounted for 89.6 percent of all pesticide-treated acres.[29]

Pesticides are powerful chemicals whose full effects are not always clearly understood. An herbicide that kills one type of

weed, for example, could be opening up an ecological niche for another weed that requires a different herbicide. Herbicides sprayed in orchards can actually increase pest damage, because weeds that pests formerly fed on are killed.30

Pesticide chemists are beginning to change their goals in pest management, from killing pests to controlling them. Scientists are studying compounds that plants and animals produce to protect themselves against pests, with the goal of reproducing these compounds for commercial use.31 This change in strategy needs to be accompanied by changes in pest management by farmers. Rather than routinely applying pesticides, farmers need to monitor their fields carefully, targeting their pesticide applications to the most effective time and location.

A recent study conducted in California revealed that consumers may be justified in their fears of pesticide residues in food. Of the 71 fruits and vegetables tested, 31 samples contained residues of 19 different pesticides. Although most of the residues were found in amounts below the tolerance levels set by the Environmental Protection Agency, there is some concern that these tolerance levels are not adequate protection against excessive pesticide contamination.[32]

Since 1971, Minnesota's Agricultural Statistics Service has performed an annual pesticide survey. A useful tool for determining the extent and rate of pesticide application on the state's agricultural land, this survey should be expanded to include information on total tonnage of pesticides applied on both agricultural and nonagricultural lands.

## FARMS AND FARMERS

The number of farms and the amount of farmland in a state give some indication of a state's potential to feed itself. A regenerative food system requires a highly diversified network of farms. If a state loses too many of its farms, it also loses the ability to develop this farming network. The same is true if a state loses too much of its farmland.

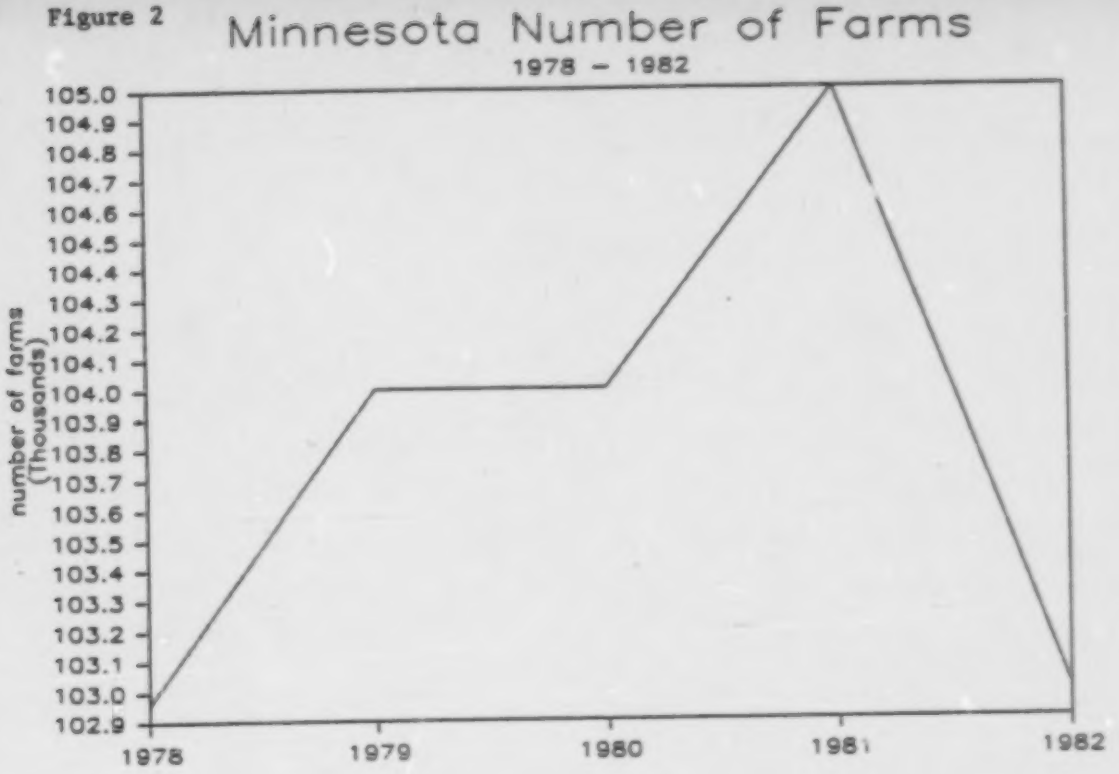
Minnesota reached its peak number of farms in 1935, when there were 203,000 farms in the state.[33] Between 1935 and 1974, the number of farms in Minnesota decreased 51 percent, to a low of 98,537 farms in 1974. Since then, the number of farms has risen to 103,000 in 1982.[34] (See figure 1.)

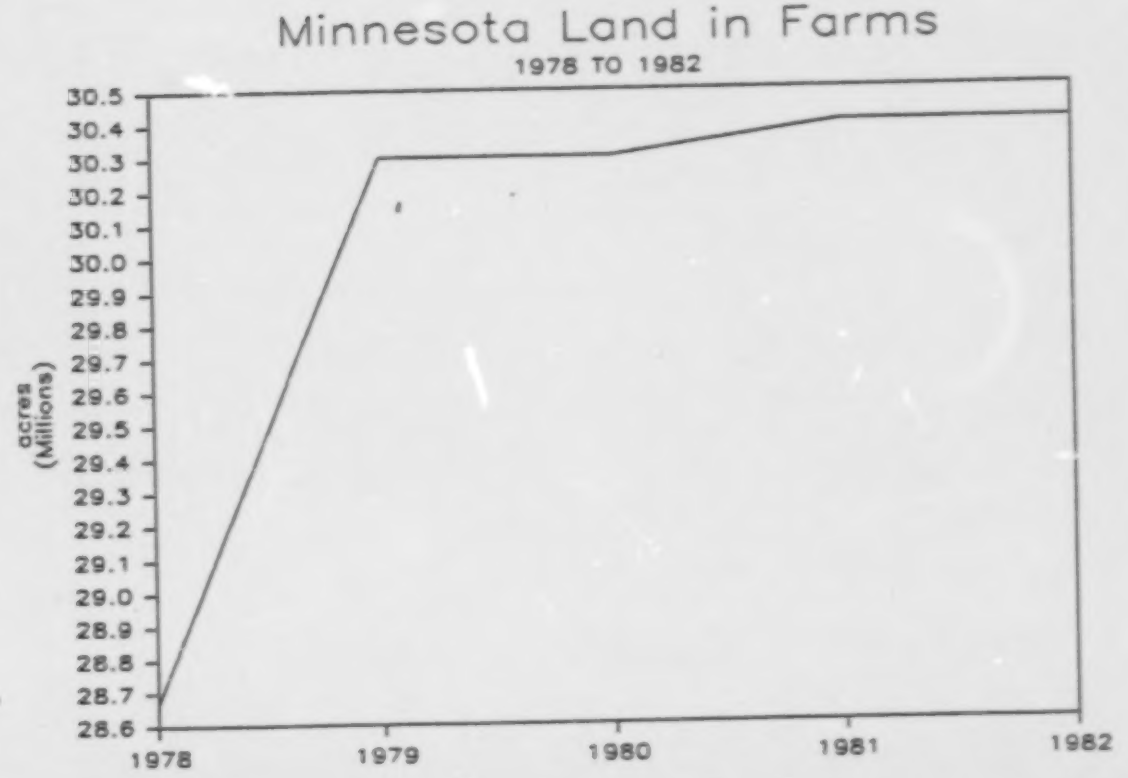
The amount of farmland in Minnesota has followed a pattern similar to the number of farms. Land in farms in the state reached its peak in 1950 with 33.14 million acres in farms.[35] By 1974, land in farms had dropped to 27.6 million acres, but then increased to 30.4 million acres by 1982.[36] (See figure 2.)

By dividing the number of farms into the amount of land in farms for any given year, average farm size can be determined. This is also an indicator for determining a state's degree of food sustainability. A large number of very small farms may indicate many beginning and/or part-time farmers, who have special financial and technical information needs. A relatively small number of very large farms may indicate that decision-making in the agricultural community rests in the hands of a few farmers, or that these farms are producing primarily for export.

State wide, average farm size in Minnesota is a conservative 295 acres (U.S. average farm size is 433 acres). The state's

Figure 2




Source: Minnesota Agricultural Statistics Service, Minnesota Agricultural Statistics 1983, p. 3.

smallest farms are in Ramsey County, where average farm size is 47 acres, while the state's largest farms are to be found in Kittson County, where average farm size is 798 acres. Farm size has increased steadily since 1930, which illustrates the trend toward larger operations and greater capital inputs in order for farms to survive economically.37

FARM DEBT

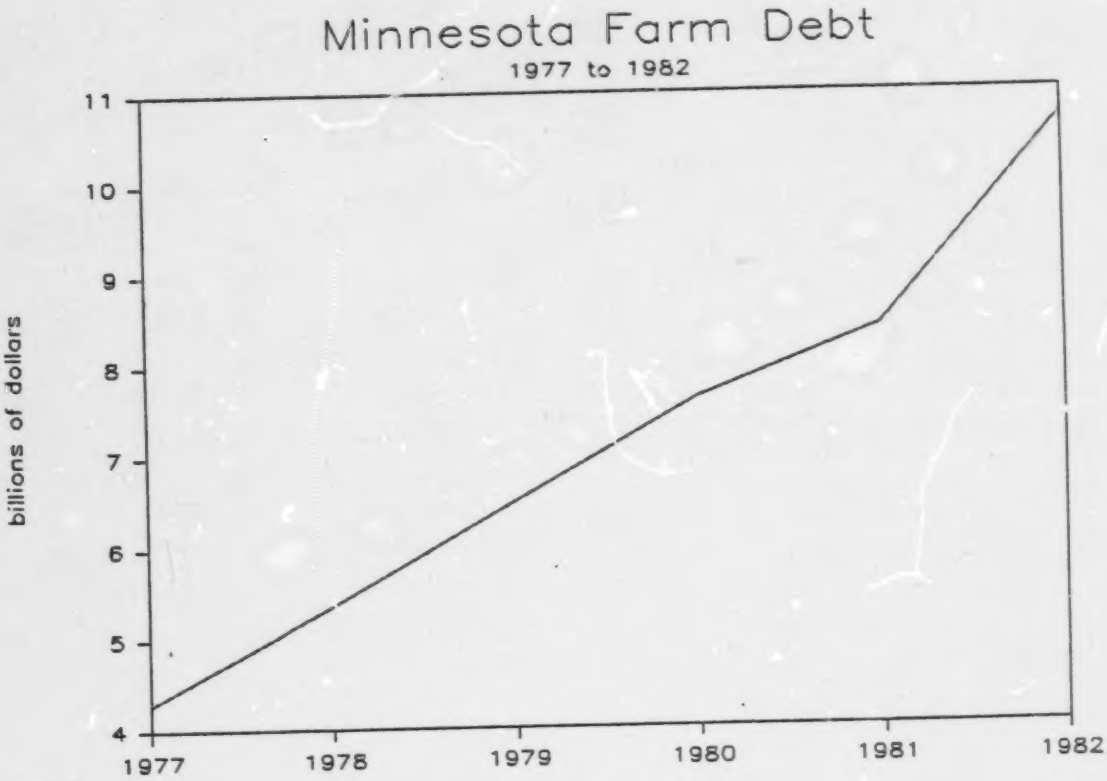
Another indicator of the health of the farming sector is the size of the farm debt. In 1982, Minnesota's farm debt stood at $10.72 billion -- about $104,056 per farm.38 Net income for 1982 was $11,512 per farm. Farm debt increased 150 percent between 1977 and 1982. (See figure 3.)

A certain amount of debt is to be expected as farmers buy, expand, and improve their farming operations. In the last several years, however, farmers have been plagued by soaring production costs, falling prices for farm products, and a weakening in the value of Minnesota's farmland. Many farmers must borrow money in order to finance the next season's production.

Eventually, farmers caught in this situation are unable to obtain further financing, and many go out of business. It is estimated that between five and ten percent of Minnesota's farmers will be forced out in 1984, with another fifteen to twenty percent seriously threatened. This means that unless economic conditions improve soon, Minnesota could lose up to a third of its farms.

Bankruptcies and financial crises are devastating not only

for farmers and their families, but also for the rural community. When farmers are strapped for cash, local businesses, from the department store to the tractor dealer, feel the pinch.




Source: USDA, Economic Research Service.

## RECOMMENDATIONS: PLANNING FOR REGENERATION

Developing a secure, sustainable, and affordable food supply is the major goal of The Cornucopia Project. To attain this goal will require a great deal of effort on many levels -- from consumer and farmer to industry and government. The Cornucopia Project has developed a set of recommendations for Minnesota that could help create a more vibrant state economy, a more secure and affordable supply of food, and an environment that is sustainable into the 21st century.

The major strategic themes running through all of the recommendations are outlined below. These four points are the most important and deserve the highest priority. They are followed by a series of more explicit recommendations aimed at the various participants in our food system -- namely, the consumer, who is the foundation of the entire food system and who has the most power to change it; the farmer, who produces our food; the food industry, which processes and distributes our food, and which has the power to improve our food system in relatively short order; the cities, which will be hit hardest by any food crisis; the state, which has the power to do many of the things necessary to make Minnesota's food supply secure; and the research community, which can improve the system we now have.

## MAJOR STRATEGIC THEMES

I. Minnesota Should Grow More Food for In-State Consumption

Growing more food in-state will help the Minnesota economy by keeping more food dollars in local areas, by reducing the $78 million food transportation bill, and by creating jobs and

increasing state revenues. Food will also be fresher and taste better, not having been subjected to early harvesting and long-distance transportation. Far less energy will be consumed in getting tood from the field to the table.

Home Gardening

The promotion of home gardening could reduce dependence on southern states for produce. Home preservation could contribute to the year-round food supply. Home grown products save consumers money because transportation and marketing costs are viturally eliminated. According to Gardens for All, 52 percent of households in the Midwest had vegetable gardens in 1983. This means that in Minnesota, over 538,000 households had gardens. Since each U.S. home garden produced, on average, $400 worth of food, the total value of food produced in the state's home gardens yearly exceeds $215 million.[39] Further research is necessary to ascertain how important home food preservation is or could be in contributing to off-season food supplies. Community gardens have become popular recently for city dwellers with little or no land available for gardening. Programs which encourage home and community gardening and give information and assistance to people wishing to grow and preserve their own food could lead to a significant decrease in fruit and vegetable imports.

II. Minnesota Should Encourage Local Markets

The benefits of buying locally as much food as possible are numerous and include lower transportation costs, less energy consumed in transportation, less waste due to long distance

hauling, and potentially more nutritious produce since vitamin and mineral content decreases with time following harvest. Local farmers benefit as much as consumers because they have a market for their produce which will pay more than an interstate broker. U.S. Department of Agriculture studies of direct markets in Colorado showed that local farmers received 44 percent higher gross returns if they sold locally than if they marketed through wholesale channels. Consumers received an average 28 percent discount compared to supermarket prices. A study in New York City showed price savings ranging from 7 to 35 percent.

One quick and inexpensive way to augment Minnesota's existing marketing program would be to conduct and publish a survey of all food producers and large-volume food buyers -- such as grocery stores, hospitals, industries, and restaurants -- to determine what farmers would produce, given a market, and what institutions would purchase, in terms of commodity and quantity. Farmers would know what the market was and buyers would know where to obtain fresh, wholesome produce.

## III. Minnesota Should Maintain Its Farm Resource Base

Soil is the foundation of one of Minnesota's largest industries. And so it is imperative that attention be given to the tons of soil being washed away into our streams, rivers, and lakes. Once the soil is lost, there is little hope of producing food for anyone, let alone of attempting to make our state more self-reliant.

Farmers are critical components of our food system. Efforts must continue to make their livelihood profitable, sustainable,

and accessible. People who wish to farm must have the financial and technical support to do so. Farm support services must be maintained to provide essential materials and services to the farm community. Farm equipment dealers, seed and fertilizer salespeople, feed mills, and agricultural credit associations as well as the coooperative extension service supply some of the necessary inputs to the farm sector. The strength of Minnesota's farm resource base is dependent upon these component parts. Support services are no less important than the other elements.

IV. Minnesota Should Continue to Expand Consumer Education and Awareness

Informed consumers can actively participate in working towards sustainablity and regeneration in the food system. Consumer demand can effectively influence the Minnesota food industry more than any regulatory or legislative action. Individuals can also have a tremendous impact on local grocery stores and their purchasing policies simply by asking for locally-grown, locally-processed foods. Increased consumer awareness and action may be the single most effective force in changing the direction of Minnesota's food system.

The following set of recommendations offers more detailed analyses of what consumers, farmers, the state and local governments, the food industry, and our research community can do to regenerate Minnesota's food system.

RECOMMENDATIONS TO CONSUMERS

1. Become more active in your food system. Increase your awareness of what foods are locally produced and which are transported in from other areas of the country. Know the nutritional quality of the food you consume. Share information with friends, neighbors, and supermarket and grocery store personnel.

2. Form a local Cornucopia Project of people who want to change their food system. Possible activities include home and community gardens, bartering, cooperative food buying, storing and preserving, food banks, and gleaning from harvested fields.

3. Purchase locally-grown fruits and vegetables in season, taking advantage of their peak nutritional value and decreased cost. You can also process these foods and store them for cold weather months to eliminate the higher prices of commercially processed and packaged food.

4. Support your local farmers by purchasing food directly from growers, thereby increasing their needed financial support while enjoying fresh, nutritious foods at reasonable prices. Start food co-ops and for additional savings, contract with farmers in the region to produce some of your food.

5. Start a home garden to produce more of your own fruits and vegetables. Community gardens provide a greater selection of produce when the harvest is shared with cooperating gardeners. They offer access to land for those (especially urban residents) who might otherwise be unable to garden.

6. Start a land trust which could purchase critical agricultural properties as they come on the market, resell them with deed restrictions to new farm owners, or transfer them to other appropriate trusts or to the city, county, or state at some future time. A land trust is a non-profit corporation which is able to own real property or interest in real property. It is one way to offer permanent protection to selective farming areas within local communities.

RECOMMENDATIONS TO FARMERS

I. Farmland Preservation

1. Take advantage of existing laws. Farmers should become better informed about specific state and local laws which can benefit them.

2. Learn about the diversity of technical assistance and services available to farmers through local conservancies and land trusts, which can show them the best options for the future use of their land, including areas which are not essential to farm production. This kind of planning service would help farmers realize certain economic benefits while still maintaining and preserving their farm operation.

3. Preserve farmland by markedly deceasing soil erosion. Your local soil conservation district will provide you with assistance in developing or updating a soil and water conservation management program, suggesting strategies to build the soil and reduce the need for increasingly costly fertilizer inputs.

4. Reduce soil losses through combinations of structural and management practices, such as conservation tillage, cropland terraces and diversions, contour farming, the use of crop residues, winter cover crops, and hedges.

5. Have soils tested accurately to determine the nutrient value of the soil and its fertilizer needs in order to prevent overuse of costly, energy-intensive fertilizers. Beware of inaccurate soil testing services.

II. Farm Inputs/Resources

1. Diversify production with selected combinations or rotations of crops or an interplay of crops with livestock. This practice would reduce fertilizer and weed control costs while providing the farmer with greater market stability.

2. Diversify production regarding not only types of crops but individual strains of a single crop so as to reduce the risk of farm pests blighting the entire crop.

3. Reduce energy use by investing in more fuel-efficient machinery, looking into solar dryers, letting crops dry naturally whenever possible, adding insulation where feasible, and taking advantage of natural lighting in farm buildings. Investigate possibilities for using alternative energy sources, whether this be the conversion of manure into methane or the use of solar heat for crop drying and other on-farm energy requirements.

4. When dealing with different soil types in large fields, consider reducing field size for maximum ecosystem diversity. This would establish a healthier ecosystem.

5. Consider using management practices that will reduce the need for chemical fertilizers, pesticides, and other expensive inputs.

6. Develop on-farm fertilizer sources by growing nitrogen-fixing legumes and green manure crops.

7. Avoid routine spray schedules. Apply pesticides only when needed and target spraying to delay the onset of insect resistance, reduce undesirable residues, do minimal damage to beneficial insects, and decrease costs.

8. Consider alternatives to pesticide use and/or reduction. These could be: integrated pest management involving monitoring pest levels for proper timing of applications, no-tillage, crop rotations and interplanting, narrow rows or broadcast seeding to establish a canopy sooner than with wide-row spacing,and biological control of pests to maintain the natural ecosystem.

III. Marketing/Economics

1. Organize marketing co-ops to provide restaurants, schools, and other institutions with locally-grown produce.

2. Work cooperatively with the consumer by selling directly to the public. This will ensure a higher price for the farmers' goods, and fresher produce for the consumer at a lower cost.

3. Locate marketing centers strategically for the assembly, grading, packing, and distribution of the output from many small producers, thereby providing large buyers with the volumes and specifications they require.

4. Consider small-scale processing on the farm such as processing sausage, cured meats, pickles, preserves, cheeses, etc. Fresh produce can be washed, sorted and packaged for sale to restaurants and markets. Dried beans, nuts, and seeds as well as honey can be sold to local food stores and restaurants.

5. Investigate before planting what specific varieties of crops purchasers wish to buy by surveying bulk food purchasers in your area.

6. Sharpen marketing skills by examining price movements to forecast supply and demand. De-emphasize concentration on farm production while allowing time to think, plan, read, and analyze the current market so as to obtain a better price

for agricultural products.

7. Begin to work towards changing grading and marketing standards to reflect the nutritious quality of the crop rather than its uniformity and appearance.

8. If necessary, encourage local newspapers to devote columns to farm problems and regularly list sources of local food in season.

RECOMMENDATIONS TO LOCAL GOVERNMENTS

1. Aid and encourage local food production and distribution by instituting a department to regulate and protect agricultural land use, encourage urban and rural food production, develop urban markets for local produce, initiate educational programs, and create plans to meet normal and emergency local food needs through local production and storage.

2. Identify the long- and short-term costs to a township before converting any prime farmland to development use.

3. Develop and encourage local food production by:

   a. Establishing city-run gardens in low income areas, and/or providing seeds, tools, and technical assistance on gardening to those receiving food stamps and other kinds of food assistance.

   b. Providing funds to establish gardens and/or greenhouses and subsidizing gardens in schools, prisons, hospitals, and nursing homes.

   c. Establishing farms on urban fringes to be worked by local farmers.

   d. Promoting contract growing whereby groups of urban families, co-ops, or the city itself arranges to purchase food directly from a local supplier.

   e. Developing loan funds for food self-reliance projects, such as greenhouses, food preservation and storage operations, and small businesses associated with urban agriculture.

   f. Establishing urban agricultural testing programs with the state Cooperative Extension Service to test crop varieties, analyze soil for nutrients and pollutants, test crops for pollutant residues, prepare demonstration sites for various types of urban agriculture and waste recycling, and offer technical assistance on farming as well as design and construction of community greenhouses, cold frames, rooftop gardens, etc.

   g. Encouraging local industries which produce low grade waste heat to make use of this energy by producing food in attached greenhouses.

   h. Requiring garden areas in new multiple unit housing projects.

i. Making certain that urban street tree programs preserve solar access for food production.

4. Develop and encourage local markets by:

   a. Establishing farmers' markets in the city, particularly in low-income neighborhoods, and facilitating authorizations for farmers to accept food stamps at the markets.

   b. Creating mobile farmers' markets and/or fish markets to visit housing projects, neighborhood centers, factories, and universities.

   c. Assisting in the formation of food cooperatives, co-op stores, and preservation/storage centers.

5. Develop and encourage local food processing and storage by sponsoring community food preserving facilities where residents use this service free or at a low cost and/or providing incentives to grocery stores to establish food preserving facilities for their shoppers.

6. Facilitate access to food by implementing a "food hotline" to provide referrals for emergency food, food stamps, and meals for elderly.

7. Create a greater understanding of the importance of agriculture to urban areas through educational programs. Offer seminars in urban agriculture, aquaculture, container and rooftop gardening, food preservation, storage, preparation, and nutrition.

8. Establish food banks in your area to store and distribute surplus food.

9. Have county institutions purchase their food supplies from local farmers.

10. Preserve the remaining farmland in the vicinity by creating agricutlural open-space preserves to retain prime farmland for agricultural use.

11. Set aside areas for recycling facilities.

12. Investigate the benefits of joint municipal planning. This process of joint planning could be particularly beneficial for those communities wanting to adopt some form of agricultural zoning and/or transfer of development rights ordinance.

13. Consider applying part of the monies from the real estate transfer tax to a local purchase of development rights program.

14. Investigate land-use techniques like clustering, performance controls, and transfer of development rights, which would give farmers greater options to develop either on the farm or in other areas within the community or region.

15. Establish an Agricultural Development Council similar to the one in Chester County, Pennsylvania. This council would focus on generating economic solutions to the problems of farmland loss in the counties. These local agricultural development councils would be comprised of people from the entire food system in the county and include farmers, processors, distributors, store managers, and farm service equipment dealers, as well as realtors and bankers. The council could develop local markets for local producers. It could survey local producers to see which ones would grow produce for local consumption and survey local stores, restaurants, and institutions to encourage them to purchase more locally grown foodstuffs. The council could also determine where local food is coming from and could promote more consumption of local foodstuffs. As suggested by Chester County, the council could become involved in "farm brokeraging" which would match new farmers with those who want to sell.

16. In addition to enforcing the soil erosion and sedimentation control measures, pass local ordinances similar to the one in Sterling, Wisconsin, which is successfully conserving all agriculture lands over one acre in size with a slope greater than 6 percent.

17. Undertake joint cooperative agreements (Memoranda of Understanding) with your local conservation district whereby Township Supervisors enable the district to review subdivision plans for adequacy of erosion and sedimentation control and stormwater management. Such agreements should also give the conservation district permission to inspect earthmoving activities to insure implementation of erosion and sedimentation control practices.

18. Investigate the agricultural Land Evaluation and Site Assessment (LESA) system being developed by the Soil Conservation Service and the U.S. Department of Agriculture. The program will assist planners in identifying farmland that should be protected based on land capability, soil productivity, soil potentials, and "important farmland" rating.

RECOMMENDATIONS TO THE STATE

1. Promote agricultural production within Minnesota and in nearby states by:

   a. Offering incentives for farmers to diversify production, utilizing technical assistance from extension agents and low-interest state-guaranteed loans to make changes necessary for diversification.

   b. Mandating a study by our Department of Agriculture, investigating the potential for producing various crops needed in the state.

   c. Establishing demonstration experiments to test crop, animal, and fish varieties suitable to our soil and climate as well as developing low-input sustainable farming techniques.

   d. Providing tax incentives for small-scale food producers, such as not taxing the first $10,000 of income from food produced for local consumption.

   e. Issuing state tax credits for home and farm production, processing, and storing of food.

   f. Encouraging new farmers through loans and incentives to enter into certain types of farming operations, those which would maintain the optimal balance of farm types in the state. (See Research Recommendations #1.)

   g. Initiating a program like New England's Small Farm Management Assistance Program to provide practical farm management skills to small-scale commercial farmers on a one-to-one basis.

   h. Organizing a farmer linkage program whereby experienced farmers bring prospective farmers into their operation, easing the transfer of land ownership over time. In this way the new farmer would be more successful in avoiding costly farming mistakes while gaining the tenured operator's knowledge of the farm.

   i. Establishing a statewide Agricultural Development Council which would seek to enhance the viability of farming throughout Minnesota in the same way that industrial development agencies seek to encourage industry to locate in-state. This kind of council would consist of representatives from all parts of the food industry.

2. Preserve remaining farmland in the state by:

a. Publishing guidelines to help local governments protect agricultural land and enhance farming. These guidelines could include ways to prevent "leapfrog" or random development, which removes from production not only the land that has been developed, but which in the long run isolates adjacent farming areas and inhibits certain farming activities. The state could also delineate ways whereby municipalities could best protect farmland in urban fringe areas, and it could prepare guidelines for different kinds of farmland preservation strategies and techniques including agricultural zoning, transfer of development rights, purchase of development rights, community land trusts, performance zoning, and so forth. It could prepare procedures which would help local governments assess the different kinds of strategies that would be most appropriate and feasible for them, given the extent of farming in the area, development pressures, commitment of farming community to remain in agriculture, existing and potential land use, economic characteristics, natural features, and attitudes of local residents.

b. Mapping all farmland that the state believes should be protected from development, identifying all Class I and II soils that are crucial to the agricultural capabilities of the state. The state of California has been engaged in mapping all of its farmland for the last few years in order to identify those areas that are important to the state for agricultural production.

c. Instituting a farmland capital gains tax in ways which would discourage speculators from investing in farmland, and then re-selling it for development.

d. Creating a committee to inventory and monitor all state-owned farmland and assess its productive capability while working to ensure that this land remains in farming.

e. Encouraging municipalities to work together through joint municipal planning by working together to enact and adopt joint municipal comprehensive plans and joint municipal zoning ordinances. This would be one way to achieve agricultural zoning on a more regional basis, which could anticipate many of the current challenges to its constitutionality.

3. Stop or decrease the loss of our topsoil by:

a. Enforcing existing anti-erosion laws by establishing new penalties for erosion damage. This would involve prohibiting all agricultural production activities which result in more than five tons of soil loss per acre per year.

b. Enforcing the soil erosion and sediment control law that requires a conservation plan for all agricultural lands in excess of 25 acres.

c. Linking economic programs, such as loans, crop insurance, disaster relief, and state purchase of farm commodities, to the avoidance of excessive soil erosion.

d. Instituting and enforcing a "severance tax" on soil losses due to excessive erosion to finance subsidies, to encourage conservation practices, and to pay for downstream dredging of silt, damage to water treatment facilities, and other social costs.

e. Establishing rewards for soil enrichment, such as tax credits for on-farm soil and water conservation programs, including contour tillage, minimum tillage, and crop rotation. Using public subsidies, such as low-interest loans, preferential farm property tax formulas and valuations, and other tax incentives to encourage cover and permanent cropping, minimum tillage, ridge planting, proper rotation, longer rotations, biological nitrogen fixation, contour plowing, terracing, stripcropping, leaving harvest residues on soil surfaces, reducing soil compaction and salinity, intercropping, and regional organic waste recycling.

f. Developing incentives for encouraging the use of rental arrangements which include provisions for sharing erosion control and soil enrichment costs with the landowner.

g. Developing public awareness programs to promote understanding of the need to support sound soil conservation practices.

4. Expand local markets by:

a. Establishing more farmers' markets and organizing wholesale farmers' markets to supply retailers, consumer co-ops, and other volume purchasers.

b. Increasing promotional efforts for direct purchase of food from farmers by supermarkets, restaurants, schools, hospitals, and other institutions.

c. Encouraging existing processing plants to purchase locally-grown products.

d. Developing linkages between large-volume food buyers and Minnesota producers.

e. Giving preference to in-state producers in bidding for

the sale of foods by permitting state institutions to purchase foodstuffs directly from local farmers and in-state producers at prices at or in excess of the lowest submitted bid according to a percentage to be determined by the state.

f. Providing assistance to small growers through a statewide markets' clearinghouse.

g. Assessing the viability of implementing in Minnesota marketing alternatives to determine price and maintain market access for individual farmers through electronic commodity markets, vertical coordination through forward contracting, forward deliverable contract markets, and mandatory public reporting of market information. Other options include exclusive agency bargaining, vertical integration through ownership, joint ventures between agricultural cooperatives and agribusiness-marketing firms, marketing orders, and marketing boards.

5. Strengthen in-state food-processing capabilities by:

   a. Providing incentives for existing food companies to develop more energy-efficient processing and packaging techniques, along with incentives to attract new food processors who wish to reduce transportation costs by locating near a major distribution center.

   b. Helping to establish community food processing and storage facilities for the use of families and small commercial food producers. In this way, economies in equipment and energy consumption can be realized.

6. Effect a transition from depletable to renewable energy sources by conducting regional inventories of all renewable energy sources and providing incentives, such as tax credits or low-interest loans for investments made in agricultural energy conservation and on-site development of renewable energy sources, or tax exemptions for income received from the production of renewable energy.

7. Recycle organic wastes to utilize their full potential by:

   a. Preparing a state-wide inventory of the types and amounts of organic wastes available now and in the future, and assess the ability of these wastes to improve soil fertility and tilth and their potential energy use.

   b. Developing incentives for using local organic wastes for fertilizer and incentives to industry to separate toxic substances from their wastes so that they might be more safely used on cropland.

8. Enact a bill which requires returnable bottles and the recycling of metal cans. This would reduce materials consumption in the food system.

9. Protect the natural environment by enforcing existing environmental protection laws, developing programs for safer handling of toxic pesticides and stronger enforcement of laws against pesticide misuse, and developing stricter standards for pesticide residues in foods. Collect data on pesticide use in Minnesota.

10. Develop long-range food system plans by:

    a. Revising and improving the methods by which crops and livestock production data are gathered so that the future direction of the state's agriculture is determined based on accurate, reliable information.

    b. Creating an overall state food policy which will increase regional self-reliance and economic viability while decreasing the vulnerability of the state's food supply.

    c. Planning for an emergency food supply disruption by strengthening our grain storage facilities' capacity.

    d. Conducting an annual study of the condition of the state food system to find out the amount of food currently being imported and exported, soil erosion losses, amount of land lost to development, and other food system issues while stating what Minnesota can do to increase its self-reliance.

11. Instill a greater understanding of agriculture's importance by:

    a. Increasing awareness of seasonal, locally-grown produce, and its nutritional and economic benefits.

    b. Initiating educational programs on farmland preservation, farm energy conservation, reduced pesticide and fertilizer use, recycling of organic wastes, and energy expenditures in different methods of farming and home food production and preparation.

    c. Promoting nutrition education campaigns illustrating the relationships between diet and health and the benefits of fresh, locally-grown, and minimally processed foods, as well as bulk purchasing of food.

    d. Communicating goals and the condition of our food supply as revealed in the state's annual study.

## RECOMMENDATIONS TO THE FOOD INDUSTRY

1. Encourage sustainable farming methods by using the food industry's influence on farm production techniques to decrease the use of dangerous pesticides and increase the use of soil conservation measures. De-emphasize produce appearance while concentrating on freshness and nutritional quality.

2. Minimize energy and material use by using less processing (and/or more efficient methods), simpler packaging, and rail networks more often in transporting commodities.

3. Move toward regionalizing food purchasing, processing, and distribution, thereby decreasing transport costs and strengthening the local economy with increased use of local labor.

4. Promote the consumption of fresh, locally-produced food in season, enhancing consumer nutrition and building a stronger local economy.

5. Provide nutrition education, hints for food preparation, and techniques on preserving fruits and vegetables.

6. Focus on food in a holistic way, recognizing that diet is an essential component of a healthy life and is influential in preventing as well as treating illness.

7. Grocery stores should purchase and label locally grown produce. Point-of-purchase literature could be made available to consumers to make them aware of where food originates and the issues involved with this.

## RECOMMENDATIONS TO THE AGRICULTURAL RESEARCH COMMUNITY

1. Determine the optimal mix of farm types in Minnesota to obtain sustainable yields of both crops and livestock to meet the state's consumption needs and to provide a sufficient level of exports. Determine the production needed to support processing plants for various commodities. If the commodity is produced in quantities sufficient to make a processing plant economically competitive, this would be an incentive for establishing those businesses in state.

2. Assess relationships between biofuels development (including forest resources) and long term soil productivity to provide guidelines for future programs.

3. Investigate how to improve the capability of using forage and Minnesota crop wastes.

4. Work to develop plants which resist pests.

5. Investigate Minnesota's soil erosion problems, looking at crop residues, run-off, tillage practices, rotation systems, terraces, and equipment.

6. Investigate perennial agriculture systems (permaculture) appropriate to Minnesota to eliminate annual soil disturbance and decrease energy, fertilizer, pesticide, and herbicide usage.

7. Determine the long-term effects of recommended applications of chemical fertilizers, pesticides, and herbicides on the productivity of selected Minnesota soils.

8. Update the Stanford Research Institute inventory of the organic wastes in Minnesota which are available to improve soil fertility and tilth.

9. Investigate methods to utilize Minnesota's municipal wastes in agriculture.

10. Expand research on biological nitrogen fixation.

11. Develop crop varieties adaptable to low-input farming systems in Minnesota.

12. Explore the potential of small-scale aquaculture in Minnesota to provide high-quality protein using cost-efficient and ecologically sound methods.

13. Set up plots to study the transition phase of switching from conventional to regenerative farming systems.

14. Examine methods for producing food in cities, e.g. rooftop food production systems. Seek ways to make urban food distribution and marketing systems more accessible to local and regional food producers.

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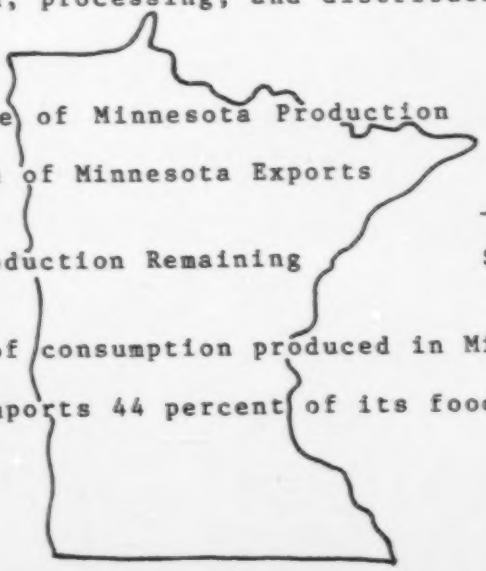
APPENDIX A

MINNESOTA FOOD CHART

Minnesota is an important agricultural state. In 1982 it ranked fifth in the nation in total farm income, ahead of both Nebraska and Kansas. Minnesota ranked in the top ten producing states for 31 commodities; production of sixteen of these commodities placed Minnesota in the top three producing states in the country.

Despite these apparent strengths, 44 percent of the food consumed in Minnesota is imported from other states and countries. Soil erosion is a serious problem in some areas of the state. Increasing production expenses and falling land prices have put up to a third of Minnesota's farmers into serious financial difficulties.

Minnesota can provide more locally grown food for its residents. An accurate assessment of the state's food requirements will enable policymakers, industry leaders, farmers, and consumers to develop a flexible, diversified regional system of food production, processing, and distribution.



| | |
|---|---|
| Retail Value of Minnesota Production | $ 13,218,874,940 |
| Retail Value of Minnesota Exports | 11,352,123,330 |
| Value of Production Remaining | $ 1,866,751,610 |

56 percent of consumption produced in Minnesota

Minnesota imports 44 percent of its food.

# Minnesota Food Chart

| Data Year | Commodity | Production: Production Retail Weight (1000 LB) | Production: Retail Value ($1000)(v) | Consumption: Consumption (1000 LB) | Consumption: Retail Value ($1000)(v) | Imports: Amount Imported as % of Consumption | Imports: Retail Value of Imports ($1000)(v) | Exports: Amount Exported as % of Production | Exports: Retail Value of Exports ($1000)(v) | Acreage Required: Acres Cropland Used in Production | Acreage Required: Acres Req. to Produce 100% of Consumption |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Meats** | | | | | | | | | | |
| 1981 | Beef | 507648.50 | 515770.88 | 352902.80 | 358549.24 | --- | ------ | 30.48 | 157206.96 | 2284418.25 | 1588078.48 |
| 1981 | Veal | 466.70 | 629.11 | 8188.00 | 11037.42 | 94.30 | 10408.87 | -- | ------- | 1726.79 | 30295.60 |
| 1981 | Lamb/Mutton | 27276.00 | 23353.71 | 5731.60 | 4907.40 | --- | ------ | 78.99 | 18447.10 | 80009.60 | 1681.27 |
| 1981 | Pork | 852154.60 | 743078.82 | 266110.00 | 232047.92 | --- | ------ | 68.77 | 511015.30 | 1216169.26 | 379784.14 |
| | **Poultry** | | | | | | | | | | |
| 1981 | Chicken | 97848.00(g) | 45604.84 | 211660.00(g) | 98650.16 | 53.77 | 53044.19 | -- | ------- | 38160.72 | 82547.40 |
| 1981 | Turkey | 338210.00(h) | 238736.47 | 43805.80(h) | 30921.74 | --- | ------ | 87.05 | 207820.10 | 179251.30 | 23217.07 |
| 1981 | Eggs | 307458.30 | 162025.64 | 137560.00 | 72491.94 | --- | ------ | 55.26 | 89535.37 | 144916.51 | 64837.20 |
| | Geese, Ducks, & Game Hens | 1510.00 | 1106.08 | 1637.60 | 1199.54 | 7.79 | 93.44 | -- | ------- | 588.90(cc) | 638.66(cc) |
| | **Dairy** | | | | | | | | | | |
| 1980 | Fluid Milk and Cream | 958744.25(ff) | 246323.52 | 914371.40 | 234923.11 | --- | ------ | 90.36 | 222577.93 | ------- | ------- |
| 1980 | Butter | 162911.00 | 844831.38 | 17604.20 | 91292.67 | --- | ------ | 89.19 | 753505.11 | ------- | ------- |
| 1980 | American Cheese | 453459.00 | 1109230.50 | 41349.40 | 101146.99 | --- | ------ | 90.88 | 1008068.70 | ------- | ------- |
| 1980 | Other Cheese(e) | 58902.00 | 144083.35 | 51175.00 | 125181.92 | --- | ------ | 13.12 | 18903.74 | ------- | ------- |
| 1980 | Dry Milk & Solids | 171643.00 | 461851.71 | 13100.80 | 35251.23 | --- | ------ | 92.37 | 426612.42 | ------- | ------- |
| 1980 | Dry Whey & Fraction Solids(i) | 244880.10 | 642339.34 | 12282.00 | 32216.63 | --- | ------ | 94.98 | 610093.91 | ------- | ------- |
| 1980 | Ice Cream | 131552.00 | 85812.38 | 70416.80 | 45933.42 | --- | ------ | 46.47 | 39877.01 | ------- | ------- |
| 1980 | Ice Milk | 23895.00 | 12989.08 | 28658.00 | 15578.20 | 16.62 | 2589.10 | -- | ------- | ------- | ------- |
| 1980 | Milk Sherbet | 9468.00 | 3088.02 | 5322.20 | 1735.86 | --- | ------ | 43.79 | 1352.24 | ------- | ------- |
| 1980 | Condensed and Evaporated Milk | NC | ------- | 30705.00 | 16524.01 | --- | ------ | -- | ------- | ------- | ------- |
| | Total in Fluid Milk Equivalents | 9488000.00 | 2388421.50 | 2292640.00 | 577128.03 | --- | ------ | 75.84 | 1811378.90 | 1718100.00 | 156146.39(aa) |
| | **Fish** | | | | | | | | | | |
| 1974 | Commercial | 6000.00 | 11922.00(hh) | 39711.80 | 78907.35(hh) | 84.89 | 66984.45 | -- | ------- | ------- | ------- |
| | Recreational | 18000.00 | 35766.00(hh,kk) | NC | ------ | --- | ------ | -- | ------- | ------- | ------- |
| | Shellfish | ------- | ------- | 13510.20 | 36557.01(hh) | 100.00 | 36557.01 | -- | ------- | ------- | ------- |
| | **Wild Game** | | | | | | | | | | |
| | Deer | 5936.82 | ------- | NC | ------ | --- | ------ | -- | ------- | ------- | ------- |
| | Ducks and Geese(z) | 5538.00 | ------- | NC | ------ | --- | ------ | -- | ------- | ------- | ------- |
| | Other Birds(z,y) | 5808.00 | ------- | NC | ------ | --- | ------ | -- | ------- | ------- | ------- |
| | Squirrels(b) | 1046.88 | ------- | NC | ------ | --- | ------ | -- | ------- | ------- | ------- |
| | Rabbits(c) | 1146.75 | ------- | NC | ------ | --- | ------ | -- | ------- | ------- | ------- |
| | **Grain** | | | | | | | | | | |
| 1981 | Wheat Flour | 4404660.22 | 2286752.80 | 489230.00 | 253991.91 | --- | ------ | 88.89 | 2032694.60 | 3670000.00 | 282012.28 |
| | Corn | 3638660.76 | 1364497.80 | 64685.20 | 24256.95 | --- | ------ | 98.22 | 1340209.70 | 7510000.00 | 18582.29 |
| | Oats | 422341.92 | 203428.02 | 12691.40 | 6113.02 | --- | ------ | 96.99 | 197304.84 | 1600000.00 | 6295.34 |

continued

## Minnesota Food Chart

| Data Year | Commodity | Production: Production Retail Weight (1000 LB) | Production: Retail Value ($1000)(v) | Consumption: Consumption (1000 LB) | Consumption: Retail Value ($1000)(v) | Imports: Amount Imported as % of Consumption | Imports: Retail Value of Imports ($1000)(v) | Exports: Amount Exported as % of Production | Exports: Retail Value of Exports ($1000)(v) | Acreage Required: Acres Cropland Used in Production | Acreage Required: Acres Req. to Produce 100% of Consumption |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Grains(Continued)** | | | | | | | | | | |
| | Rye | 20393.47 | 8803.18 | 2865.80 | 1237.07 | --- | ------ | 93.93 | 8268.83 | 93000.00 | 1650.80 |
| | Barley | 1368538.75 | 546275.03 | 4912.80 | 1961.03 | --- | ------ | 99.64 | 544308.44 | 1030000.00 | 1827.68 |
| | Soybeans | 1596909.60 | 1286843.00 | 36846.00 | 29691.74 | --- | ------ | 97.69 | 1257116.90 | 4400000.00 | 18609.09 |
| 1981 | Wild Rice | 3300.00 | 19767.00 | NC | ------ | --- | ------ | --- | ------ | 16000.00 | ------ |
| | Sunflowers | 411775.00 | 380891.88 | 114.63 | 12.72 | --- | ------ | 99.97 | 380777.61 | 713000.00 | 99.25 |
| | Rice | ------ | ------ | 45034.00 | 45034.00 | 100.00 | 45034.00 | --- | ------ | ------ | 10228.03 |
| | **Vegetables & Fruits** | | | | | | | | | | |
| 1981 | Potatoes, White | 1494700.00 | 255545.48 | 476860.93(o) | 81527.84 | --- | ------ | 68.10 | 174026.47 | 76100.00 | 24329.64 |
| 1980 | Potatoes, Sweet | NC | ------ | 17861.30(o) | 6914.05 | 100.00(dd) | 6914.05 | --- | ------ | ------ | 3418.43 |
| 1980 | Spinach | NC | ------ | 8190.00(o) | 1215.29 | 100.00(dd) | 1215.29 | --- | ------ | ------ | 1310.40 |
| 1980 | Broccoli | NC | ------ | 15246.10(o) | 10119.97 | 100.00(dd) | 10119.97 | --- | ------ | ------ | 3025.02 |
| 1981 | Carrots | 41600.00 | 10373.16 | 53070.00(o) | 13233.26 | 21.61 | 2859.71 | --- | ------ | 1300.00 | 2282.58 |
| 1980 | Green Peppers | NC | ------ | 13100.80 | 9508.65 | 100.00(dd) | 9508.65 | --- | ------ | ------ | 2282.58 |
| 1980 | Asparagus | NC | ------ | 3021.40(o) | 4518.26 | 100.00(dd) | 4518.26 | --- | ------ | ------ | 1119.04 |
| 1980 | Beans, Snap & Lima(j,ee) | NC | ------ | 28728.40(o) | 10985.37 | 100.00(dd) | 10985.37 | --- | ------ | ------ | 9804.91 |
| 1980 | Cabbage | NC | ------ | 36441.90(o,p) | 8510.95 | 100.00(dd) | 8510.95 | --- | ------ | ------ | 2277.62 |
| 1980 | Lettuce | NC | ------ | 97437.20(r) | 28099.63 | 100.00(dd) | 28099.63 | --- | ------ | ------ | 7733.11 |
| 1981 | Peas(d) | 174490.00 | 64730.16 | 15974.80(o,e) | 5926.14 | --- | ------ | 90.84 | 58800.88 | 56800.00 | 7984.40 |
| 1980 | Tomatoes | NC | ------ | 175264.10(o) | 34261.31 | 100.00(dd) | 34261.31 | --- | ------ | ------ | 20864.77 |
| 1980 | Cucumbers | NC | ------ | 39325.30(q) | 12702.07 | 100.00(dd) | 12702.07 | --- | ------ | ------ | 5285.66 |
| 1980 | Celery | NC | ------ | 29476.80(r) | 8662.38 | 100.00(dd) | 8662.38 | --- | ------ | ------ | 767.63 |
| 1981 | Onions | 19900.00 | 6188.26 | 41103.80(o) | 12781.96 | 51.59 | 6594.21 | --- | ------ | 750.00 | 2283.44 |
| 1981 | Corn, Sweet(d) | 1146680.00 | 106160.37 | 61835.80(o) | 5724.80 | --- | ------ | 94.61 | 100438.33 | 105200.00 | 11778.25 |
| | Turnips | NC | ------ | NC | ------ | 100.00(dd) | ------ | --- | ------ | ------ | ------ |
| | Herbs | NC | ------ | 7369.20 | ------ | 100.00(dd) | ------ | --- | ------ | ------ | ------ |
| 1981 | Beans, dried | 133900.00 | 92002.26 | 16785.40 | 11533.19 | --- | ------ | 87.46 | 80465.18 | 103000.00 | 12911.85 |
| 1980 | Beets | NC | ------ | 6337.50(o) | 480.42 | 100.00(dd) | 480.42 | --- | ------ | ------ | 609.38 |
| 1980 | Dried Peas & Lentils | NC | ------ | 1837.60 | 492.86 | 100.00(dd) | 492.86 | --- | ------ | ------ | 1091.73 |
| | Radishes | NC | ------ | NC | ------ | 100.00(dd) | ------ | --- | ------ | ------ | ------ |
| | Garlic | NC | ------ | 2456.40(r) | 1354.98 | 100.00(dd) | 1354.98 | --- | ------ | ------ | 409.40 |
| 1980 | Endive | NC | ------ | NC | ------ | 100.00(dd) | ------ | --- | ------ | ------ | ------ |
| 1980 | Kale | NC | ------ | NC | ------ | 100.00(dd) | ------ | --- | ------ | ------ | ------ |
| 1980 | Pumpkin & Squash | 12000.00 | 6000.00 | 4437.90(o,s,t) | 2218.95 | --- | ------ | 63.01 | 3780.s0 | 525.00 | 233.57 |
| 1980 | Cauliflower | NC | ------ | 9711.00(o) | 6171.18 | 100.00(dd) | 6171.18 | --- | ------ | ------ | 624.90 |
| 1980 | Brussel Sprouts | NC | ------ | 1427.70(o) | 988.10 | 100.00(dd) | 988.10 | --- | ------ | ------ | 158.30 |
| 1980 | Parsnips | NC | ------ | NC | ------ | 100.00(dd) | ------ | --- | ------ | ------ | ------ |
| 1980 | Avocados | ------ | ------ | 7369.20 | 5134.67 | 100.00 | 5134.67 | --- | ------ | ------ | 8886.58(w) |
| 1980 | Berries | NC | ------ | 2161.60(l) | 2698.51 | 100.00(dd) | 2698.51 | --- | ------ | ------ | 649.71 |
| 1983 | Cranberries | ------ | ------ | 2865.80 | 3038.67 | 100.00 | ------ | --- | ------ | ------ | 159.21 |
| 1980 | Cherries | NC | ------ | 8188.00(l) | 6519.50 | 100.00(dd) | 6519.50 | --- | ------ | ------ | 1350.18(w) |
| 1980 | Peaches | ------ | ------ | 47465.80(l,n) | 18986.32 | 100.00 | 18986.32 | --- | ------ | ------ | 1481.36(w) |
| 1980 | Apricots | ------ | ------ | 3602.70(l,n) | 1644.46 | 100.00 | 1644.46 | --- | ------ | ------ | 311.12(w) |
| 1980 | Pears | ------ | ------ | 19180.40(l,n) | 6063.48 | 100.00 | 6063.48 | --- | ------ | ------ | 968.80 |
| 1980 | Pineapple(gg) | ------ | ------ | 40653.42(k,l) | 4756.45 | 100.00 | 4756.45 | --- | ------ | ------ | 1310.37(w) |
| 1980 | Plums and Prunes | NC | ------ | 18365.70(k,l,n) | 16902.37 | 100.00(dd) | 16902.37 | --- | ------ | ------ | 1481.61(w) |

Continued

# Minnesota Food Chart

| Data Year | Commodity | Production: Production Retail Weight (1000 LB) | Production: Retail Value ($1000)(v) | Consumption: Consumption (1000 LB) | Consumption: Retail Value ($1000)(v) | Imports: Amount Imported as % of Consumption | Imports: Retail Value of Imports ($1000)(v) | Exports: Amount Exported as % of Production | Exports: Retail Value of Exports ($1000)(v) | Acreage Required: Acres Cropland Used in Production | Acreage Required: Acres Req. to Produce 100% of Consumption |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Vegetables and Fruits (Continued)** | | | | | | | | | | |
| 1980 | Grapefruit(x) | ------- | ------- | 80209.65(k,l,m) | 13260.47 | 100.00 | 13260.47 | -- | ------- | ------- | 3096.16(w) |
| 1980 | Lemons and Limes(x,BB) | ------- | ------- | 10550.24(k,l) | 3576.87 | 100.00 | 3576.87 | -- | ------- | ------- | 407.24(w) |
| 1981 | Apples | 22000.00 | 14193.55 | 134717.20(k,l,m) | 86914.32 | 83.67 | 72721.21 | -- | ------- | 3425.76 | 20977.05(w) |
| 1980 | Melons | NC | ------- | 77786.00 | 23536.54 | 100.00(dd) | 23536.54 | -- | ------- | ------- | 5939.22 |
| | Rhubarb | NC | ------- | NC | ------- | 100.00(dd) | ------- | -- | ------- | ------- | ------- |
| 1980 | Strawberries | NC | ------- | 14885.80(l) | 19783.71 | 100.00(dd) | 19783.71 | -- | ------- | ------- | 753.62 |
| 1980 | Tangerines & Tangelos | ------- | ------- | 8188.00 | 2818.26 | 100.00 | 2818.26 | -- | ------- | ------- | 316.06(w) |
| 1980 | Papaya | ------- | ------- | 818.80 | 538.82 | 100.00 | 538.82 | -- | ------- | ------- | 32.62(w) |
| 1980 | Figs | ------- | ------- | 1965.10(n) | 960.36 | 100.00 | 960.36 | -- | ------- | ------- | 307.61(w) |
| 1980 | Olives | ------- | ------- | 4912.80 | 2741.66 | 100.00 | 2741.66 | -- | ------- | ------- | 1461.66(w) |
| 1980 | Dates | ------- | ------- | 3111.40(n) | 3181.66 | 100.00 | 3181.66 | -- | ------- | ------- | 287.77(w) |
| 1980 | Escarole | NC | ------- | 2456.40 | 1283.67 | 100.00(dd) | 1283.67 | -- | ------- | ------- | 191.91 |
| 1980 | Artichokes | ------- | ------- | 2047.00 | 2291.32 | 100.00 | 2291.32 | -- | ------- | ------- | 255.88 |
| 1980 | Eggplant | ------- | ------- | 2047.00 | 957.47 | 100.00 | 957.47 | -- | ------- | ------- | 181.15 |
| | **Miscellaneous** | | | | | | | | | | |
| 1981 | Sugar (Beet) | 1033396.00 | 1146400.00 | 104806.40 | 116287.48 | --- | ------- | 89.86 | 1030334.40 | 257000.00 | 26062.43 |
| 1981 | Honey | 8170.00 | 11168.39(hh) | 4912.80 | 6715.80(hh) | --- | ------- | 39.87 | 4452.84 | 102125.00 | 61410.00 |
| | Molasses | ------- | ------- | 818.80 | 1487.76(hh) | 100.00 | 1487.76 | -- | ------- | ------- | ------- |
| 1980 | Maple Syrup | NC | ------- | 409.40 | 211.64(hh) | 100.00(dd) | 211.64 | -- | ------- | ------- | ------- |
| 1980 -83 | Coffee | ------- | ------- | 31523.80 | 86312.16(hh) | 100.00 | 86312.16 | -- | ------- | ------- | 34249.08 |
| 1980 -83 | Cocoa | ------- | ------- | 11872.60 | 19292.98(hh) | 100.00 | 19292.98 | -- | ------- | ------- | 6595.89 |
| 1980 | Peanuts | ------- | ------- | 24973.40 | 19334.23 | 100.00 | 19334.23 | -- | ------- | ------- | 9335.85 |
| 1980 | Tree Nuts | NC | ------- | 7778.60 | 21897.51 | 100.00(dd) | 21897.51 | -- | ------- | ------- | 4670.01 |
| | Yeast | NC | ------- | ------- | ------- | --- | ------- | -- | ------- | ------- | ------- |
| | Salt | NC | ------- | ------- | ------- | --- | ------- | -- | ------- | ------- | ------- |
| 1980 -83 | Tea | ------- | ------- | 3273.20 | 13225.26(hh) | 100.00 | 13225.26 | -- | ------- | ------- | 2138.53 |
| 1980 | Sugar (Cane) | ------- | ------- | 220257.20 | 16843.20 | 100.00 | 16843.20 | -- | ------- | ------- | 3033.85 |
| 1980 | Other Syrups & Sugars | NC | ------- | 269790.00 | 284358.66(hh,ii) | --- | ------- | -- | ------- | ------- | ------- |
| 1980 | Coconut | ------- | ------- | 1637.60 | 2738.07(hh) | 100.00 | 2738.07 | -- | ------- | ------- | 4681.67 |
| | **Fats and Oils** | | | | | | | | | | |
| 1981 | Lard | 136943.20 | 80111.77(hh) | 10235.00 | 5987.48(hh) | --- | ------- | 92.33 | 74127.42 | 3582323.90(hh) | 1999839.49(hh) |
| 1980 | Shortening | NC | ------- | 75739.00 | 91265.50(hh) | 100.00(dd) | 91265.50 | -- | ------- | ------- | ------- |
| 1980 | Margarine | NC | ------- | 45852.80 | 56444.80(hh) | 100.00(dd) | 56444.80 | -- | ------- | ------- | ------- |
| 1980 | Food Oils(f) | NC | ------- | 96209.00 | 114296.29(hh,jj) | 100.00(dd) | 114296.29 | -- | ------- | ------- | ------- |
| | TOTALS | 20481861.82 | 13218874.94 | 5479428.37 | 3349572.21 | --- | 1022857.65 | -- | 11352123.33 | 128983890.99 | 4981963.38 |

## References for Chart

(a) Includes turkeys, coots, snipe, rails, gallinules, woodcock, pheasant, ruffed grouse, spruce grouse, sharp-tailed grouse, and hungarian partridge.

(b) Includes gray squirrel and fox squirrel.

(c) Includes cottontail rabbits, jack rabbits, and snowshoe hare.

(d) Peas for processing.

(e) Includes cottage cheese.

(f) Consumption includes soybean oil.

(g) Average weight of chicken calculated at 4.5 lb. per bird.

(h) Average weight of turkey calculated at 16.45 lb. per bird.

(i) Percentage of dry whey for human consumption is calculated to be 90.3% derived as follows:

$$\frac{\text{lb. MN human food whey}}{\text{lb. MN total dry whey}} \times 100.$$

(j) Conversion factor used for total fresh weight of beans is an average of the conversion factors for lima and snap beans.

(k) Conversion of juice to lb. of fresh fruit is calculated as follows:

X lb. fresh fruit equals Y lb. juice
X/Y = conversion factor.

(l) Total lb. of fresh fruits are calculated from the summation of their uses in canned, frozen, dried, and juice consumption figures.

(m) Canned and chilled citrus sections are considered to be grapefruit sections.

(n) Includes the conversion of dried fruits to their respective fresh weights in lb.

(o) Total lb. of fresh vegetables are calculated from the summation of uses in canned, frozen, dried, and juice consumption figures.

(p) Includes cabbage and sauerkraut.

(q) Includes cucumbers and pickles.

(r) Fresh usage only.

(s) Not listed as having significant fresh usage (under .005 lb.).

(t) Not listed as having significant frozen usage (under .005 lb.).

(u) Imports and exports calculated from retail weights.

(v) Average retail markups from farm prices were used to calculate retail value.

(w) Yields are calculated from 1981 production divided by the bearing area of fruit.

(x) Citrus in lb. is calculated from number of boxes of citrus times number of lb. per box.

(y) Weight used for "other birds" is averaged at 4 lb. dressed.

(z) Dressed weights used for wild birds are taken from the commercial dressed weights:
Ducks at 4 lb.
Geese at 10 lb.
Other birds at 4 lb.

(aa) For acreage required to produce 100% consumption, the total milk produced was used rather than deducting the amount fed to calves.

(bb) Acres used for production and acres required for 100% consumption of lard are totals of all meat acreages.

(cc) Grain needed to produce one bird was calculated using commercial broiler figures.

(dd) Close to 100% is imported, however exact figures are not available.

(ee) Farm value of all beans is the average of farm values of lima and snap beans.

(ff) The fluid milk component of total milk production was calculated as follows:

$$\frac{\text{1983 6 month production for fluid milk}}{\text{1983 6 month production for all milk}} \times 100$$

= % used for fluid milk. Using this percentage:

1980 total milk production x % for fluid milk

= 1980 fluid milk production.

(gg) Consumption data does not contain complete information on frozen concentrated juices and flavored drinks (i.e., lemonade).

APPENDIX B

ORGANIZATIONS CONCERNED ABOUT FOOD SELF-SUFFICIENCY AND SUSTAINABLE AGRICULTURE

--All Cooperating Assembly
PO Box 14440
Minneapolis, MN 55414
612-376-8357 Ludeen Perry

Assembly of 100 organizations concerned with food issues such as food distribution, education, legislation and lobbying, nutrition, research, alternative life styles.
Publish: newsletters for various projects.

--American Planning Association, Minnesota Chapter
City Hall Annex-12th Floor
25 W. Fourth St.
St. Paul, MN 55102
James Bellus, President

Interested in land/land use, rural planning, and the rural environment.
Publish: The Minnesota Planner newsletter, and monthly business letters.

--Countryside Council
PO Box 78
Marshall, MN 56258
507-532-9641 Musiel Runholt

Interested in agricultural land preservation, and the rural environment.
Publish: Prairie Schooner newsletter, and research reports.

--Distributing Alliance of the North Country Cooperatives, (DANCe)
510 Kasota Ave.
Minneapolis, MN 55414
612-378-9774 Martin Stern

Interested in food distribution, nutrition, education, legislation and lobbying, research, and alternative lifestyles.
Publish: DANCe News newsletter.

--Dittberner Audrey and Lowell-Pyramidal Research Consultants
Route #1 Box 43
Parkers Prairie, MN 56361
218-338-2212

Interested in pyramidal greenhouses, solar energy, and greenhouses for food self-sufficiency.

--The Environment, Agribusiness, Resources, Technologies, and Horticultural Association of Minnesota, (EARTH)
Room 545
Capitol Square Building
St. Paul, MN 55101
612-296-0663 William E. Hohenhaus

Interested in agricultural wastes, environmental education, gardening and farming, land/land use, and soil conservation.

--Family Foods Coop
E. College Drive
Marshall, MN 56258
507-532-9997 David Green

Interested in selling food, education, and organic agriculture.

--Federated Garden Clubs of Minnesota, Inc.
3320 W. 90th St.
Bloomington, MN 55431
612-831-4847 Eileen Kulak

Interested in acid precipitation, gardening and farming, organic gardening, pesticides, soil conservation, and water management.
Publish: newsletter.

--Food Learning Center
114½ E. Second St.
Winona, MN 55987
507-452-1815 Evelyn Roehl, Coordinator

Interested in food distribution, education, legislation and lobbying, nutrition, research, and alternative lifestyles.
Publish: Faminews newsletter.

--Friends of the Earth, Minnesota
4425 Abbott Av. S.
Minneapolis, MN 55410
612-330-4745 John Cornelison, Chairperson

Interested in acid precipitation, appropriate technology, pesticides, and the general environment.

--International Alliance for Sustainable Agriculture
1701 University Av. S.E.
Minneapolis, MN 55414
612-331-3437 Terry Gipps

Interested in sustainable agriculture, organic gardening and farming, food self-sufficiency, and appropriate technology.

--Izaak Walton League of America, Inc., Minnesota Division
3255 Hennepin Av. S.,Suite 109
Minneapolis, MN 55408
612-827-5361 Robert Strauss, President

Interested in land/land use, soil conservation, water resources, and the general environment.
Publish: The Minnesota Waltonian and pamphlets.

--Midwest Ecological Resource Center, Inc.
4130 McCulloch
Duluth, MN 55804
218-525-2692 Alden Lind

Interested in land/land use, rural planning, the rural environment, and the general environment.
Publish: research reports.

--Minnesota Association of Soil and Water Conservation Districts
2095 Delaware
Mendota Heights, MN 55118
612-296-3767 Dorothy Waltz, Secretary

--The Minnesota Project
2222 Elm St. S.E.
Minneapolis, MN 55414
612-378-2142 Martha Greenwald
1-800-582-5179

Interested in agricultural land preservation and groundwater quality.
Publish: Minnesota Connections newsletter, research reports, and pamphlets.

--Minnesota Public Interest Research Group
2412 University Av. S.E.
Minneapolis, MN 55414
612-376-7554 John Gohngostovich, Director

Interested in food education, research, legislation and lobbying, land use, and agribusiness.
Publish: Statewatch newsletter.

--Minnesota State Horticultural Society
161 Alderman Hall
1970 Folwell Av.
St. Paul, MN 55108
612-373-1031 Glenn H. Ray

Interested in food supply, gardening and farming, soil conservation, and pesticides/herbicides.
Publish: Minnesota Horticulturist.

--North Country Ecological-Agriculture Center
Box 9747
Minneapolis, MN 55440
612-376-8335 Marilyn Larson

Interested in appropriate technology, food supply, gardening and farming, soil conservation, land/land use and food education.
Publish: Sprouts newsletter.

--Organic Growers and Buyers Association (OGBA)
PO Box 9747
Minneapolis, MN 55440
612-376-8335 Marilyn Larson

Interested in appropriate technology, gardening and farming, herbicides, land/land use, pesticides, and soil conservation.
Have a resource collection.

--Soil Conservation Society of America, Minnesota Chapter
U.S. Soil Conservation Service
Federal Building Room 200
316 N. Robert St.
St. Paul, MN 55101
612-725-7575 Russell Adams, President

Interested in agricultural land preservation, agricultural wastes, environmental education, land/land use, and soil conservation.
Publish: newsletter and position papers on issues.

# APPENDIX C

# LEGISLATION CONCERNED WITH FOOD SELF-SUFFICIENCY AND SUSTAINABLE AGRICULTURE

## APPENDIX C

## FOOD AND AGRICULTURE RELATED LEGISLATION

### Minnesota Statutes

--17.03 Powers and Duties-Commissioner of Agriculture.
Promote development of agricultural industry and markets of farm products. Assist farmers, producers, and consumers in the organization of coops.
1919 with updates to 1975.

--329.08, .14 Licensing of State Peddling.
Agricultural producers are exempt.
1911.

--308.01-.92 Cooperatives.
Formation and rules.
Coop types and membership.
1919 with updates to 1981.

--17.51-.69 Agricultural Commodities Promotion Act.
Department of Agriculture, farmers, handlers, dealers, and processors are to stimulate use, sale, and consumption of Minnesota commodities.
Set up Commodities Research Council to improve marketing, production, and processing of commodities.
1969.

--362A.01-.08 Minnesota Rural Development Finance Authority Act.
Finance agricultural projects.
Promote research and new job opportunities.
1971.

--41.51-.61 Family Farm Security Program.
Help small farmers obtain credit to buy land.
1976 with updates to 1983.

--17.102 Labeling Minnesota Products.
Logo of "Produced in Minnesota" can be placed on packaging.
Optional to producer and manufacturer.
1979.

--116J.33 Minnesota Biomass Center.
Formed to coordinate education and training programs in the use of grain, biowaste, and cellulosic materials for biomass.
Study laws on biomass production, marketing and distribution needs, and consumer information.
1981.

—17.80 State Agricultural Land Preservation and Conservation Policy.
Protect farmland from conversion to other uses.
Promote planned growth in urban and rural areas.
Foster owner-operated farms; conservation of soil and water resources.
1982.

—473H.01-.18 Metropolitan Agricultural Preserves Act.
Control taxation of agricultural land in metropolitan areas.
Protect farms from local and state restrictions on farm operations.
Help maintain productive farm operations.
1982.

C8111-1.23F

# THE SOUTH CAROLINA FOOD SYSTEM:

# DOES IT HAVE A FUTURE?

A Study of the South Carolina Food System

by

John Madera

and

The Cornucopia Project of the
Regenerative Agriculture Association

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## INTRODUCTION

South Carolina is a relatively small state with a population one-third the size of New York City's. Like most other southeastern states, it has a long growing season. A variety of foodstuffs are grown within South Carolina's borders, and locally grown vegetables can be found year-round, for the state's unusually diverse climate and topography belie its modest size. Cool-climate crops such as apples can be found in the northwestern mountains while small quantities of sugarcane are known to have been produced along the state's subtropical coast. The land and people in between have made South Carolina the nation's top producer of fresh market peaches (1978). It ranks third in flue-cured tobacco, seventh in fresh tomatoes, eighth in peanuts, and ninth in forest products(1).

Those people old enough to remember the 1930s also know how resilient and resourceful South Carolina's farmers can be. They have witnessed a greening of the state unthinkable back when continuous cotton culture drained the last ounces of productivity from the soil and the boll weevil made thousands of farmers and their families leave the land forever.

Despite the progress made, South Carolina faces new threats -- not just to its agricultural income, but to the ability of its people to obtain food. For example:

* nearly half of all the fresh fruits and vegetables in South Carolina supermarkets come from just two states: Florida and California(2). Yet Florida agriculture relies heavily on non-renewable and expensive chemicals in quantities which pose a threat to human and ecological health(3); California fields are drawing water for irrigation at a rate that cannot be

sustained(4); and the cost of bringing food from those states to our plates would soar during another oil shortage.

* much of our beef is from cattle raised on feeds grown in midwestern states such as Iowa(5), which loses almost 10 tons of soil per acre each year to erosion, nearly twice the tolerable rate. At present rates of soil erosion, some major wheat producing areas of the U.S. have only one or two decades of productivity left(6).

* South Carolinians spent $77 million in 1982 for shipping in food from out-of-state(7) -- nearly $9 million of that solely for fresh vegetables which can be grown here commercially(8).

* South Carolina imports nearly all of its processed fruits and vegetables from other states(9).

* Approximately 6,000 farmers in South Carolina were forced to leave farming for good during the last three years because they couldn't pay their debts.

Most of us cannot see what our food system is doing to our health and the health of those who supply our food, and to the ability of future generations to feed themselves. Our food system, as a whole, behaves as if there is no tomorrow: to produce cheap, plentiful food it is mining oil (for pesticides and energy), minerals (for fertilizer), soil, and water. Essentially, we are mining our food -- without the slightest thought of when the mines will give out. A responsible alternative would be to build a food system which is less dependent on non-renewable resources such as oil and phosphate, and less destructive of future soil productivity, environment, and human health. A start toward those goals is to grow more food closer to home, and to fit our diets to a more local, sustainable agriculture. This report will begin to explore how we can do that in South Carolina.

## WHERE DO WE STAND?

### Food Imports

Looking at South Carolina's small population, abundant, level lands, year-round mild climate and plentiful rainfall, it is somewhat surprising to learn that 64 percent of the food we eat is brought here from other states and countries(10).

An abundance of certain foods is produced in the state. During June, tomatoes sold in New York supermarkets are most likely to be South Carolina grown. And our peaches make their way onto tables in Europe. The state's farmers grow more than twice as much fresh and pickling cucumbers, squash, sweet potatoes, and watermelons as we consume here, and nearly double our consumption of snap beans and cantaloupes. However, we also import nearly all of these very same commodities from as far away as California and Mexico to satisfy year-round demand. South Carolina vineyards provide half the grapes consumed here. The difference is made up with fruit from California and Chile(11). Okra, a vegetable which one horticulturalist described as being "ideally suited" for production here(12), is currently being shipped in from Mexico(13). Nearly all of canned and processed fruits and vegetables are brought in from other places (see table 1 for the loss to the state's economy incurred by importing foods).

Not only is much of our food shipped in from needlessly long distances, but a lot of it is shipped out first for processing before coming back to the local supermarket. Like most southeastern states,

Table 1

Amounts and Costs of Vegetables Imported Into S.C. Which Could be Grown Here (1982)

| | Amount Consumed[a] In South Carolina (1,000 lbs.) | Amount Imported (percent) | Money Leaving[b] S.C. (farm value) ($1,000) | Transportation[b] Cost ($1,000) |
|---|---|---|---|---|
| Asparagus | 936.60 | 100.00 | 576.77 | 89.44 |
| Beets | 3,746.40 | 99.00 | 837.06 | 129.81 |
| Broccoli | 5,931.80 | 99.00 | 2,082.70 | 322.99 |
| Celery | 22,478.40 | 100.00 | 3,297.53 | 511.38 |
| Carrots | 19,668.60 | 99.00 | 2,373.22 | 368.04 |
| Cauliflower | 5,307.40 | 100.00 | 171.12 | 26.54 |
| Onions, bulb | 28,722.40 | 99.00 | 3,236.26 | 501.88 |
| Green peppers | 9,990.40 | 99.00 | 3,013.44 | 467.33 |
| Potatoes | 147,046.20 | 99.00 | 13,141.93 | 2,038.06 |
| Cabbage | 23,727.20 | 85.89 | 1,905.46 | 295.50 |
| Eggplant | 1,561.00 | 99.00 | 418.53 | 64.91 |
| Spinach | 2,497.60 | 99.00 | 1,339.30 | 207.70 |
| Sweet corn | 20,293.00 | 85.78 | 24,469.82 | 3,794.80 |

a. From South Carolina Food Imports, Rodale Press.

b. From Developments in Farm to Retail Price Spreads for Food Products in 1980, USDA Economics and Statistics Service, Agricultural Economics Report 465 (Washington, D.C.: GPO, 1981), p. 24: transportation transportation cost = .05 x retail cost; farm value = .32 x retail cost.

South Carolina ships beef cattle to midwestern feedlots to be fed to full weight. So your neighbor's calves may leave to grow up on an Iowa farm before coming back as beefsteak.

An extensive transportation network fueled by cheap energy has allowed a near constant supply and diversity of fresh fruits and vegetables year-round. Fresh fruits and vegetables are a bargain in the U.S. compared with other countries. But being able to choose from a wide variety of produce year-round from one spacious, well-lighted supermarket, a luxury unknown two generations ago, does not come without a heavy price. For example, a supermarket chain in the state recently was paying $4 for freight charges per box of western lettuce valued at $3.50 -- just to secure a consistent supply and quality(14). In 1982, South Carolinians spent a grand total of approximately $77 million just to move food around. In order for fruits and vegetables to survive their travels, they must be picked before they are fully ripe. Produce picked prematurely is less flavorful and nutritious, so we end up paying higher prices for food of inferior quality.

Dependence on long-distance food also makes our food supply vulnerable to oil shortages. With our current food system, a 10 percent reduction in oil stocks would cause fresh produce prices to rise by 55 percent(15).

Approximately half of our imported fresh fruits and vegetables come from California and Florida. Dependence on one or two food-growing regions make our food supply vulnerable to freezes, plant pest quarantines, and labor disputes.

Amount of Agricultural Land

South Carolina has plenty of potential for expanding the very base of its food productivity, land. Approximately 13 percent of the state's rural land not now in cropland has a "medium" or "high" potential for conversion to cropland. If so converted, the state's cropland could increase by 1.7 million acres, or nearly half-again the acreage now in production. Most of the land said to have a "high" conversion potential -- 71 percent -- is in Class I or II, and therefore the best type of land for farming. There are 109,400 potential cropland acres along the coast(16), where warm ocean waters make for a long growing season (more than 280 days a year)(17) and one of the most productive vegetable producing areas in the east. These unused acres could stock South Carolina with all of the fresh, canned, and frozen vegetables and fruits it now demands(18). Statewide, only half of the crops are grown on "prime" farmland. Land here isn't being used as efficiently as it could be(6).

Since 1940 farmland across the U.S. has been vanishing, and until the early 1970s South Carolina followed that trend, losing farmland equivalent in area to a county each decade to other uses. But during the past decade, farmers have begun to realize some of our state's potential in food and fiber. Falling from 5.2 million acres in 1945 to an all-time low of 3.2 million acres in 1974, farmland expanded to 3.4 million acres by 1978 and reached 3.6 million acres by 1982(19).

While these facts are encouraging, development poses a serious threat to some of South Carolina's most unique and valuable farmland. During the past 20 years developers, vacationers, and retirees have

discovered the beauty of the state's "Sea Islands," and resort developments have mushroomed. Now, condominiums, golf courses, and shopping centers are spreading inland, encroaching on tomato, melon, and cucumber fields. The productivity of coastal vegetable farming decreases dramatically with each mile away from the shore, with the growing season decreasing by more than a month and a half just 30 miles inland(20). In Charleston and Beaufort, two of the state's most important vegetable-producing counties, 26,000 acres fell out of production between 1974 and 1978(21). Loss of these highly productive areas will make the state's food supply less sustainable.

Even if all of the arable land in the state were brought into production, it still couldn't meet all the food needs of South Carolina's population. Of course, total self-sufficiency is not necessarily a desirable goal in and of itself. A greater capability to provide food closer to home and a decreased reliance on distant food would make the food system less vulnerable to energy shortages and transit strikes while creating more desperately-needed jobs in the state's rural areas.

## Soil Erosion

Acres are only one dimension of the base of our food supply. Another is the substance which makes it vital -- soil. The livelihood of a great many South Carolinans early this century was destroyed by soil abuse. Fertilizers and chemicals have allowed today's farmers to buy time. However, the soil, and our future, is still washing away.

Soil erosion is not nearly as visible as it was two generations ago. From the time plows first broke ground in the colony, the landscape, in some areas, has melted away by more than 12 feet(22)! The first effort in the Southeast to halt this incredible wash was an attempt in South Carolina to control a yawning gully roughly 725 feet long, 50 feet wide, and 35 feet deep(23). There are indications that we are still paying for such abuse: because of it, pasture forage has less mineral content, causing increased costs and reducing the competitive strength of the state's dairy and livestock industries(24).

Although soil loss today is much less visible, it is more insidious. Every year approximately 17.5 million tons of soil wash away -- enough to cover the city of Columbia with more than an inch and a half of soil, a blanket thicker than the average annual snowfall(25). One acre-foot of soil contains about 8,000 pounds of nitrogen and 2,000 pounds of phosphorus, as well as two inches of available water for crops. Using 1980 fertilizer prices, the annual cost of erosion in South Carolina can be estimated at $13.7 million(26).

The total amount of land eroding in excess of "tolerance" levels amounts to about five percent of all the nonfederal rural land across the state. But this figure doesn't show the true picture. For example, 57 percent of all cropland in the Piedmont, the region with the worst erosion problem, is eroding in excess of tolerance levels(27). This theft of our food-producing capacity is masked by hybrid seeds, chemicals, and specialized machines. However, the short-run economies of abusing the soil are bound to backfire: studies indicate that soil preservation may result in significant reductions in future production

costs, especially as energy-based inputs rise in value(28). Many farmers here may already realize this. The number of acres under conservation tillage climbed from 26.7 million in 1972 to 96.1 million in 1981. By cutting fuel and labor costs, farmers can save an average of $10 to $12 per acre(29).

Farm Size/Ownership

The way the land is managed depends largely on the amount of land a farmer manages. The same short-term economic considerations that have led to soil degradation are also at work increasing the size and diminishing the number of farms. Large farms require large machinery, which in turn requires even more acreage to allow the farmer a greater return on investment. These large machines are more dependent on vulnerable petroleum supplies, cannot handle soil-conserving terraces and contours, and compact the soil. Quality is forsaken as plants are bred to yield tougher produce solely to withstand the grasp of a mechanical harvester. With fewer farmers, rural economies are hurt, people move away, and entire communities are destroyed. Across the country, 100,000 farms have disappeared annually between 1950 and 1970 -- nearly 2,000 each week. Average farm size since 1920 has tripled, rising from 150 to 450 acres(30). Using 1978 data, the USDA found that one percent of farmland owners control 30 percent of all U.S. farmland. Yet a recent USDA study claims that a 143-acre farm in the Southeast can be 90 percent as cost efficient as a 399-acre farm(31). A horticulturalist at Tuskegee Institute in Alabama has devised a plan for small farms (10-200 acres), using state-of-the-art practices, to gross

more than $100,000 a year(32).

Farms with gross incomes of less than $20,000 comprise about 80 percent of all of the state's farms, but control only about 42 percent of all South Carolina farmland, and account for only 12 percent of total sales. While the average U.S. farm is 450 acres, the average size of South Carolina's farms is only 189 acres. Families own 91 percent of the farms in the state. No southern state has more "small" farms (those with sales of from $1,000 - $2,500) except Mississippi and Alabama(33). Slightly more than 40 percent of all South Carolina farms are from one to 49 acres in size(34). Clearly, South Carolina is a state of small farms, and the health of those farms is vital if South Carolina is to grow more food. Yet a study of small farmers in the state concluded that many of them are operating below technical potential(35).

South Carolina has followed the national trend toward fewer, bigger farms. From 1974 to 1981, the trend reversed itself slightly. For the first time since the advent of the tractor, farms shrank. Farm size in South Carolina decreased by 10 percent while the number of farm operators climbed from 29,275 to 33,430 from 1974 to 1978, a 14 percent jump. Farms with gross incomes of less than $20,000 showed the greatest growth in numbers, climbing by 16.2 percent(36). In 1980, the year farmers' ranks peaked, the state was hit by the worst drought in its history -- after suffering droughts in two of the previous three years. Being offered low prices for what they were able to harvest, farmers couldn't begin to repay the debt they took on to gear up to supply a once-favorable world market. Thus, South Carolina began losing farmers at a rate never before seen -- 6,000 by 1984(37).

Farm Debt

Whether or not anybody husbands our food resource base at all depends on whether farmers can make a living for themselves, make needed investments, and pay off their debts. As mentioned before, South Carolina farmers, in numbers not seen in generations, aren't doing that. Last year, the state's commissioner of agriculture estimated that 35 or 40 percent of farmers statewide are in a position where they're going to have a hard time staying in business over the next few years. The Farm Bureau director estimated that 25 to 30 percent of the state's farmers are on the brink of bankruptcy(38).

Historically, southern farmers have had a more difficult time staying afloat. Southern agriculture accounts for 27 percent of total cash receipts for farm commodities in the U.S., yet keeps only 22 percent of the net farm income. The net income for a typical farm in the South is only 66 percent of the U.S. average. Production costs are higher because the relatively infertile soil requires more fertilizers, and more pesticides are used to combat the many pests which thrive in the warm, moist climate. Thus, the southern farm is less able to adjust to poor harvests or endure price declines(39). South Carolina, however, was hit by devastating droughts in 1977, 1978, and 1980. After each season, farmers borrowed heavily to make up losses and prepare for the next season -- and they watched their debt load climb steadily.

The weather didn't cause all of the farmers' problems, however. World demand for U.S. agricultural products during the early 70s brought farmers good prices, encouraging them to plant fencerow to fencerow. Then, by mid-decade, with the first in a series of agricultural

embargoes, food was used as a political weapon -- with U.S. farmers as the victims. South Carolina production in 1982 was good, but by then huge national surpluses and a shrinking world market brought prices way down. For the first time, interest paid on loans by South Carolina farmers was equal to the unadjusted farm income for the state. The FmHA loan delinquency rate was running about 55 percent at the end of that year, an all-time record for that agency. The state's Production Credit Association extended about 3,000 loans in 1982, a figure three times higher than it was just two or three years earlier(40). Farmers who have invested their lives in the land are being forced to leave it. And our food system is losing their years of valuable experience.

Farm Inputs

The desperate situation that most South Carolina farmers are in has been made worse by the rising costs of inputs. From 1974 to 1978, total expenditures in the state rose 14 percent for fertilizer, 58 percent for other chemicals, 50 percent for hired labor, and 55 percent for gas and petroleum. However, the acreage of harvested cropland rose by only one percent, and the value of its product rose only 28 percent(41). The gap between inputs and income is closing, leaving farmers increasingly less able to pay off their debts.

Ironically, the South Carolina crops for which input costs are highest -- cotton, tobacco and peanuts -- also are bringing in the highest returns per dollar and per acre(42). These profits may prove to be fragile, however: these crops require large amounts of fertilizers and pesticides, inputs derived from limited petroleum and mineral

stocks. As these resources become increasingly scarce, costs will climb at an ever faster rate.

More than other inputs, fertilizers and pesticides are energy and petroleum intensive, and their prices have generally followed the skyrocketing cost of oil. A 1980 study illustrates how rising fuel prices and decreasing supply by themselves eat away at farmers' incomes: paying $1.10 per gallon of gasoline, even when using energy-conserving minimum-till techniques, farmers may be losing more than $1 million (gross) compared to what they would have made if petroleum prices remained at 1978 levels. In the event of another gas shortage -- one that forced farmers to idle land because they couldn't get the fuel to farm it -- the impacts would be more dramatic. A reduction of just five percent in fuel supplies from 1978 levels was estimated to cost state farmers in 1981 more than $4 million(43). For comparison, supplies during the 1973 oil embargo shrank by four percent(44). Although planting "high-cost" crops is currently very profitable, and indeed may be helping many farmers stay afloat, South Carolina agriculture may do well to plan for a future in which rising costs of inputs make these crops less attractive.

## Fertilizers

As resources become more scarce, fertilizer prices will continue to rise. Manure is an attractive alternative: it's cheap, doesn't depend on oil, and increases the water-holding capacity of the soil. Current practices, however, have turned manure into a water pollution problem: it has been estimated that the amount of sewage from farms is 17 times

greater than from cities and industries in the state. Biological wastes can cause lakes and ponds to "die," or eutrify, as nutrients from such wastes cause oxygen levels in the water to drop and algae to grow, suffocating fish populations (45).

As untreated or underused farm wastes threaten lakes and streams, heavily applied commercial fertilizers may have already threatened human health. Nitrates (from commercial fertilizers) have turned up in the drinking water in the city of Florence(46). And despite their rising costs, fertilizers are applied wastefully. Based on soil test results the state extension service, during 1980, most frequently recommended application of fertilizers containing potassium but no phosphorus (South Carolina soils have a tendency to retain phosphorus while much of the applied potassium is leached beyond the plow layer). Yet less than five percent of the total mixed fertilizers sold contained potassium and no phosphorus, while more than 80 percent contained phosphorus, some in equal measure with potassium(47). There is evidence that manure alone can supply half of the state's potassium needs(48). Estimates on actual manure use vary widely: one source claims that 75 to 90 percent of the manure generated is being utilized, while another states that only 30 percent of farmers in the state return animal wastes to the land(49).

Phosphate rock, from which phosphorus in commercial fertilizer is produced, is a particularly vulnerable resource. The U.S. is now a major exporter of phosphate rock, but reserves are expected to dwindle and may be exhausted within 20 years(50). It is possible that a handful of countries in the Middle East may eventually control 75 percent of the

world trade in this mineral. A cartel could easily be formed to control prices if this were to happen(51). Nitrogen for fertilizer is most commonly made using natural gas, a limited, non-renewable resource. The manufacture of one ton of ammonia, the most common form in which nitrogen is fixed in fertilizer, requires about 38,000 cubic feet of natural gas(52), enough to heat an average home for nearly four months(53).

## Pesticides

Pesticides have been eating away farm incomes faster than any other input. Pesticide (including fungicide, rodenticide, etc.) spending, compared with that for other variable inputs including gas and petroleum, showed the sharpest increase from 1974 to 1978 in South Carolina(54). No figures are kept on pesticide use and effects in South Carolina -- but it is probably safe to assume that the application rate in this state is much higher than the national average equivalent of 3.7 pounds of active ingredient per person each year(55). The state's warm, humid climate is a haven for insects and plant diseases. Also, cotton, tobacco, and peanuts -- crops on which huge quantities of pesticides are used -- are planted on a substantial amount of acreage in the eastern half of the state.

To date, there has been no comprehensive effort to study the effects of pesticide use on health and the environment in South Carolina. Occasional "red flags" here show that such knowledge is long overdue:

* Three private wells in Barnwell County were found to be contaminated with the pesticide EDB (subsequent sampling of wells at other locations has shown no traces of the chemical).

* A well in Edgefield County in 1982 was found to be contaminated with DBCP, a chemical which has caused sterility among male workers producing it, and has been suspected of causing cancer and chromosome damage in fetuses. Because of these possible hazards, the chemical was banned by the federal government in 1982(56).

* From 1979 to 1984, 42 fish kills, mostly in farm ponds, have been attributed to herbicides and pesticides(57).

* One to three reported incidences per year of shrimp poisoning (affecting a total of about two trawler loads) have been caused by the spraying of endosulfin on nearby tomato fields(58).

* Scientists are now beginning to piece together evidence indicating that even trace amounts of pesticides may seriously impair the ability of shellfish to reproduce, causing economic damage to the shellfish industry that is difficult to calculate(59).

The way in which pesticides are regulated in South Carolina may be working toward <u>increased</u> dependence on chemicals. Clemson University, the state's primary agricultural research institution, and as such, a receiver of research grants from chemical companies, also doubles as the state's pesticide regulator under a federal act governing pesticides. The dangers inherent in such a setup were clearly shown in 1981 when peach growers wanted help controlling nematodes, which attack the roots of peach trees, against which the banned chemical DBCP was effective. Seeking an emergency exemption from the ban by the EPA, Clemson produced research to prove that the chemical could be used safely -- research funded partly by the only U.S. firm producing DBCP. The ban was successfully fought in court. The research received wide criticism in the academic community, and estimates of crop losses due to the ban eventually proved to be exaggerated(60). Such a closed system between regulator, regulated, and research, which tends to shut out participation of consumers, the public at large, advocates of reducing

chemical use, and even the state health commissioner, does not work in the best interest of the food system as a whole.

Climate, Water, and Irrigation

As mentioned earlier, the state's farmers were hit hard by summer-long droughts in 1977, 1978, and 1980. In terms of dollar value of crops lost, the year 1980 went down as the worst in South Carolina history(61). South Carolina has a relatively high average rainfall during the planting and growing season, but in this case, averages mean little. Rainfall is very unevenly distributed through the planting and growing season, with dry spells lasting one to two weeks or longer(62). In five out of 10 years one can expect a large part of the state to have a minimum of slightly more than 60 drought days from April through October for soils with a field capacity (the total amount of moisture that the soil will hold against the force of gravity) of two inches. Soils over much of the Coastal Plain, where much of the state's cropland is, hold less than two inches(63).

That is why many farmers are turning toward irrigation as a form of crop insurance. Farm irrigation in South Carolina shot up 29 percent in 1980 to 110,000 acres, and the trend is expected to continue. That acreage may grow to 500,000 -- 15 percent of the state's active cropland -- within the next decade(64).

Whether or not our water supply will hold up through this increased demand appears to be anyone's guess. One study of the Santee-Lynches region predicts abundant water even for heavy irrigation(65) -- while another source reports that groundwater levels in parts of the Piedmont

and Coastal Plain show serious signs of decline. Danger to the vegetable-producing areas along the southern coast is clear and present: Parris Island, Beaufort, and much of Hilton Head Island have lost their freshwater aquifers, and in Savannah, Georgia, the water table has dropped to as much as 150 feet below sea level, forcing Georgia officials to place a moratorium on further pumping in that area(66). When water tables near the coast drop sufficiently low, the fresh water in them is replaced with salt water. This is an irreversible process: once fresh groundwater is lost, it's gone forever.

The reliability of irrigation as insurance against drought is also questionable. Rural landowners have found that since the devastating 1980 drought, some wells were producing at half the rate of the previous year(67). During droughts, demand for groundwater is bound to climb. Meanwhile, the water table drops and some wells go dry. Streams and rivers in some areas have shrunk under heavy pumping, in some cases killing fish(68).

While irrigation is certainly better than crop losses to drought, it may not fit in well with the structure of South Carolina agriculture. Irrigation may not be the answer for the state's small or part-time farmers. Irrigation equipment is expensive, and accurate bookkeeping methods in estimating production costs is necessary to insure the efficient and cost-effective operation of irrigation systems(69). Small and part-time farmers use these methods far less rigorously than other farmers(70). More research is needed on water supply, demand, and efficient allocation. Study is also needed on the impacts of irrigation on soil, water, energy supplies, the structure of the state's

agriculture, ways irrigation can be made more accessible to small and part-time farmers, and on drought-resistant crops and varieties for South Carolina.

Monoculture

A third of South Carolina's agricultural receipts come from one crop, which is susceptible to drought like most other crops, and is much more vulnerable than most to climbing input prices. However, it is also vulnerable in a third way: politically. At the time of the most recent Census of Agriculture, tobacco accounted for almost one-third of the state's total value of crops produced -- $204 millior. The future of tobacco and its growers may be far different, however, as political support for the tobacco stabilization program appears to be waning. Declining demand for tobacco exports, the growing concern over health hazards of smoking, and the system of hereditary rights to grow tobacco, under which many of the farm owners don't manage the farm themselves, are all contributing to concern over the program(71). Some economists say that ending the tobacco program would wipe out a large part of tobacco production, as tobacco prices would become highly unstable. If this were to happen, it is easy to conceive of "ghost town" scenarios in which farmland prices plummet, farmers become unable to pay back loans by selling their property, farm equipment dealerships go out of business, local governments can't to collect enough property taxes to pay for police and schools, and joblessness and population loss become pervasive(72).

## Fisheries

Fish provide more of the world's protein than beef, pork, or eggs(73). South Carolina is a net exporter of shellfish. But despite its proximity to the prolific waters of the Gulf Stream, South Carolina still imports about 18 percent of the finfish it consumes(74).

Oystering has declined during the past 20 years. In Beaufort County, for example, 20 oystering operations were in business in 1960. Only three remain today. Competition from other areas has taken a toll: the Chesapeake Bay, noted for its large, uniform oysters which are more easily shucked, has taken some of South Carolina's traditional market(75). Development pressures along the coast are also closing shellfish beds as wastewater from new housing and resort developments finds its way into estuaries: approximately one-third of South Carolina's shellfish beds are closed because of bacterial pollution(76). Pesticides from agricultural runoff are now suspected, even in minute quantities, of cutting shellfish harvests by decreasing the reproductive ability of shellfish(77).

Overspecialization -- fishing for one particular species -- may also be contributing to the decline of the state's fishing industry. Specialization decreases energy efficiency, since fishermen must burn more fuel in search of a boatload of one species. Intensive fishing of a small number of species depletes the stocks of these fish, drives up prices, and wastes unconventional species which are nonetheless highly edible. East coast fishermen have reported that 30 percent of their catch are so-called "trash fish" which are often discarded at sea and frequently killed in the process(78).

Aquaculture and mariculture, the "farming" of fresh- and saltwater fish and shellfish, show great promise in regionalizing our protein production, cutting dependence on imported energy, and generating rural jobs. More than half of the state's area is considered average in climate and soil characteristics for warmwater fish farming, while 10 percent is above-average(79).

## Food Industry

Growth from the land is just the first step food takes toward its final goal, human health and vitality. Most of the food we eat is further processed -- packaged, canned, frozen, dried, and refined -- after leaving the farm.

South Carolina's processing capacity doesn't begin to meet the state's demand. Like fresh vegetables, our processed foods are shipped in from many distant places. South Carolinians, in turn, are not only shipping out dollars and jobs, but also paying the freight bill.

Several manufacturers of highly processed foods have built plants in the state, and future growth in this industry here seems bright -- except for farmers. An eggroll plant trucks in celery and cabbage, which can be grown here, from other states. South Carolina is the nation's eighth biggest producer of tomatoes, but apparently they're not of the "right type" for two in-state frozen-dinner makers, who would rather ship in their supply from California(80). Profits are high from frozen "gourmet dinners" and other specialty foods, and manufacturers can cut a greater share of their costs by locating in areas like South

Carolina, with its low wages and taxes and abundant labor supply, rather than near the fields or large urban markets.

Eggroll manufacturers, as well as simple canners and freezers, look for a large, dependable, consistent, year-round supply of food commodities to keep their plants running. To engage "consumer loyalty," they try to make the quality of their product as consistent as possible -- through setting rigid and often arbitrary quality and consistency standards for the produce they buy from the farmer. Simple canning and freezing is done by "primary" processors, for final consumption, or by "pre-processors," who sell their product to other firms to be made into such things as frozen dinners. Since the profit margin on simply processed foods is low, primary processors must turn over large quantities of local produce to stay in business. Such firms have not been willing to come to South Carolina because farmers, holding out for the higher prices that fresh-market produce brings, have been unwilling to commit a consistent share of their crop to processing. However, such a contract can benefit both farmer and processor. The farmer can be assured of a market for a bumper crop, and the processor can keep operating in a short harvest(81).

## Forest Resources

Forests are an integral part of the food system. They supply the raw material for packaging, they can become a substantial source of energy for farms, they build soil and regulate the flow of streams, lower summer air temperatures and increase local humidity and rainfall, and produce on land that is otherwise too rocky or hilly for

farming(82).

South Carolina's third largest cash crop and third largest industry is forest products. Two-thirds of the state is covered in potentially commercial forests, 73 percent of which are owned by farmers and other small landowners(83).

A "sleeping green giant" has been one way in which the potential of South Carolina's forests as an employment generator has been described. Only 49 percent of the state's yearly forest growth is harvested, leaving a net annual gain of 51 percent to the existing forest stock -- tree growth which has already attracted $1.3 billion in industrial growth for the first half of this decade. In economic terms, the timber crop supports a $2.02 billion enterprise which includes more than 600 primary and secondary wood-using plants with a combined capital investment of more than $500 million, employing 30,000 workers(84). Since our forests are a renewable resource, the jobs generated by this investment represent secure, long-term employment(85).

Wood is also a home-grown energy resource, and a revival in its use as fuel is opening up markets for trees otherwise unsuitable for commercial use, and for logging residues which have traditionally been piled and burned. Conservative estimates of the annual productivity of "woody biomass" in the state's forests equal approximately 80 percent of the entire annual energy consumption for all purposes(86). Already in-state factories such as three brick companies, two textile mills, and one food processor, have switched from petroleum to wood energy. The greater use of wood here can do much in creating a sustainable economy: it is a dependable and renewable resource, its use produces income

locally, creates jobs and expands the tax base, and it expands the market for small landowners and can make better land management practices cost-effective through higher income per acre(87).

To make sure that the potential of these forests in creating a sustainable economy and food system unfolds, that small landowners retain their stake in its development, and that it is developed with methods that are not self-destructive, the people of South Carolina must begin to act now.

## Energy Crops

As fossil fuel energy becomes more scarce and expensive, farmers may be increasingly called upon to supply the energy needs for a sustainable economy. Alcohol production is one route to energy self-reliance. One study estimates that South Carolina can eventually become gasohol self-sufficient (that is, it can offset 10 percent of its gasoline demand with alcohol from South Carolina grain). If 10 percent of existing grain production were diverted to ethanol, and ethanol were produced from crop and food wastes, the state could offset one percent of gas consumption. With proper incentives and a guaranteed prospect of larger markets, production could climb to five percent. This percentage could climb substantially, however, if farmers were willing to switch their animals from grain to high-protein stillage (a byproduct of the fermentation process).

There are other farm sources of ethanol. New varieties of sweet potato are being developed which can yield four to six times the ethanol

per acre that corn can. Crop residues also show promise for energy production. It has been estimated that excess crop residue (production over the minimum required to control water erosion) could generate an additional $20 million in gross farm income in South Carolina(88).

Currently there is no ethanol production plant in the state. Any investor considering such a plant would have to be assured of a long-term supply of feedstocks such as corn at a fixed or predetermined price. This is a problem, however, because many South Carolina farmers have been reluctant to commit to long-term supply contracts at predetermined prices. This reluctance has also been identified as an impediment to the development of a food processing industry here (89).

In building a sustainable food system, agriculture has a responsibility to free itself from dangerous and non-renewable sources of energy. It may also play a legitimate role as the source of renewable energy for a sustainable economy-at-large. Whether energy competes with food for land, or the land becomes an energy source for a sustainable society, will become a key question which we must begin to address now. Before deciding how the land should be used we must answer these questions: (1) does it take more energy to grow energy crops than the crop's energy yield? (2) are the inputs required to grow energy crops themselves sustainable? (3) does the reduction in regional food supply due to land tied up in energy crops increase our dependence on non-renewable energy for our food? (4) How much renewable energy can be found in other sources, such as solar building design, energy-efficient urban planning, wind and hydropower, etc.? (5) What are our true energy needs?

## Nutrition

There is evidence that an adequate, affordable diet is not now available to all South Carolinians. There are not yet any comprehensive statistics on the extent of hunger and malnutrition in the state, although a study is under way. Fifteen percent of Americans live at or below the poverty level. That number climbs to over 20 percent in parts of the Piedmont(90). Virtually every available federal program aimed at alleviating hunger and malnutrition is available and being implemented in South Carolina. Yet there are indications that these programs aren't working: the state's infant mortality rate (mostly due to low birthweight) is the highest, and its life expectancy is the shortest, in the nation(91).

## WHAT DO THESE FACTS MEAN?

There are some good things and some bad things about the system which provides South Carolinians with their food. Taken as a whole, however, the situation does not look good. The food system, heading on its present course, will eventually cease to be a source of health and vitality for most South Carolinians. It is providing us with less nutritious food than it could while it is burning up fuel, water, and land; endangering our health and that of the natural system we live in; and is giving us fewer and fewer choices over what we eat and how it is grown or made, as decision making falls into fewer and fewer hands -- in short, our state's food system cannot be sustained for very long. However, there is no human or natural law which demands that it remain on its present course. South Carolina's people have had the resourcefulness to save the state from a faltering one-crop economy and a dying soil. We have the land, water, soil, and climate to build a more sustainable food supply. All we lack is the will to do it. To get that will, we must first agree on what the goals of our food system should be.

In a sense, the problems of our food system are all actually one problem: that most people see the goal of the food system as short-term economic gain. However, the main reason why we eat at all is to maintain our health (of course, our health also depends on the health of the natural environment). Thus, it is reasonable that the first and foremost goal of the food system should be the health and vitality of as many people as possible, now and in future generations. To adopt that goal is the first step toward a sustainable food system -- as well as

toward a stronger economy for South Carolina.

To develop a sustainable supply of food will require a great deal of effort and change on many levels, from consumer to farmer to industry and government. Much has already been done in South Carolina: food banks have been established in Greenville, Columbia, and Charleston to reduce the wastage of unsalable food; research and extension work is under way in aquaculture and mariculture, and a large research center has been built for that purpose; methods for reducing the use of pesticides are being adopted; a state agency has been established to provide financial advice to small-scale and family farmers; and more people are making the connection between health and a proper diet. There is still much left to do. The major strategic themes outlined below reflect the goals of a sustainable food system and indicate the general directions it should take in South Carolina:

1. South Carolina should grow more food for in-state consumption. Growing more food in-state will help the South Carolina economy by keeping more food dollars in local areas, by reducing the $77 million food transportation bill, and by creating jobs and increasing state revenues. Food will also be fresher and taste better, not having been subjected to early harvesting and long-distance transportation. Far less energy will be consumed in getting food from the field to the table.

2. South Carolina should encourage local markets. This is necessary to make a more regional food system possible.

3. South Carolina should maintain its farm resource base. We must preserve the foundation of our food system, the soil -- without it, there is little hope of producing food for anyone. The best lands for farming should be preserved for farming. Efforts must continue to make farmers' livelihoods profitable, sustainable, and accessible.

4. South Carolina should continue to expand consumer education and awareness. Informed consumers can actively participate in working towards sustainability and regeneration in the food system. Individuals can have a tremendous impact on local grocery stores and their purchasing policies simply by asking for locally-grown,

locally-processed foods.

These themes serve as the basis for the following, more specific recommendations aimed at the various participants in the food system: the consumer, who is the foundation of the entire food system and has the most power to change it; the farmer, who produces the food; the food industry, which processes and distributes the food, and has the power to improve the food system in relatively short order; the cities, which will be hit hardest by any food crisis; the state, which has the power to do many of the things necessary to make South Carolina's food supply secure; and the research community, which can develop new knowledge to improve the food system.

## RECOMMENDATIONS TO CONSUMERS

1. Increase your awareness of what foods are locally produced and which are transported in from other areas, and the effects production practices have on the people and ecology of those areas. Know the nutritional quality of the food you consume. Share information with friends, neighbors, your church, supermarket and grocery store personnel, and, if you are a member of a food co-op, with other members.

2. Become a food producer, alone or with others. Possible activities include establishing home and community gardens; bartering; storing and preserving food for cold-weather months to eliminate the need for higher-priced commercially processed and packaged foods; and gleaning from harvested fields.

3. Purchase locally-grown fruits and vegetables in season at roadside stands, "pick-your-own" operations, and farmers/fish markets, taking advantage of their peak nutritional value and decreased cost while making local farming a viable enterprise.

4. Start or join a food co-op or buying club which contracts with regional farmers.

5. Change your eating habits to improve and maintain your health by consuming less fat, salt, sugar, and cholesterol while increasing fiber and vegetable protein intake.

6. Try raising backyard animals like rabbits, chickens, or fish. Chickens and rabbits take up little space, are efficient converters of feed into meat, and their manures can be used as garden fertilizer. Fish gardening in a backyard or basement pool can provide a family with up to 100 pounds of fish in a single growing season.

## RECOMMENDATIONS TO FARMERS

If followed, these recommendations may not only preserve the land and environment, but will most likely improve the farmer's financial stability and income through reduced production costs, secure markets, and higher prices.

1. Insure against drought by growing more crops during the winter, when rainfall is more regular, and by investigating drought-resistant crops. Irrigation should be considered with the utmost caution and planning, as it can increase debt without a guaranteed pay-back, damage the soil and endanger water supplies. Drip-trickle systems minimize water and energy waste and soil erosion.

2. Diversify production with selected combinations or rotations of crops or an interplay of crops with livestock. This practice would reduce fertilizer and weed control costs while providing the farmer with greater market stability. In South Carolina, winter crops require less weed and insect control, are less susceptible to drought, and help the farm produce income all year. By diversifying their crops, farmers are less susceptible to the wild fluctuations of the price of a single crop, and to the variations of weather, pests, and disease. They might lose money on one or two enterprises, but they will make up for these losses with other crops. Tractor size can be reduced by spreading power requirements over a longer period of time. With capital and production input costs increasing far more rapidly than the market value of the produce, diversification to increase the efficiency of those expensive resources is essential.

   Diversify production regarding not only types of crops but individual strains of a single crop to reduce the risk of farm pests blighting the entire crop.

3. Stop soil erosion. Right now there is more money to be made by mining the soil than by saving it. Out from under the burden of 13 percent interest rates, and with public support for conservation, the farmer could take a short term "loss" for a big long-term gain. Soil-saving strategies can become part of the farm plan again, reducing the need for costly fertilizer inputs.

   a. Contact your local soil conservation district for assistance in developing or updating a soil or water conservation management program.

   b. Reduce soil losses through combinations of structural and management practices such as conservation tillage, cropland terraces and diversions, contour farming, and the use of crop residues, winter crops, cover crops, and hedges.

c. Take land that is severely eroding out of production.

d. Use marginal lands for grazing livestock instead of crop production.

e. Have soils tested accurately to determine the nutrient value of the soil and its fertilizer needs in order to prevent overuse of costly, energy-intensive fertilizers. Beware of inaccurate soil testing services.

4. Cut inputs. Farmers can minimize or eliminate the use of many expensive inputs and lower operating costs without significantly affecting yields. Through spending less money, they can make more.

   a. Consider using management practices that will reduce the need for chemical fertilizers, pesticides and other expensive inputs.

   b. Avoid routine spray schedules. Apply pesticides only when needed and target spraying to delay the onset of insect resistance, reduce undesirable residues, do minimal damage to beneficial insects, and decrease costs.

   c. Consider alternatives to pesticide use and/or reduction. These could be: integrated pest management involving monitoring pest levels for proper timing of applications, no-tillage, crop rotations and interplanting, narrow rows or broadcast seeding to establish a canopy sooner than with wide-row spacing, and biological control of pests to maintain the natural ecosystem.

5. Develop on-farm alternative energy sources. Investigate sources such as the conversion of manure into methane and the use of solar heat for crop drying, and reduce energy use by investing in more fuel-efficient machinery, letting crops dry naturally whenever possible, adding insulation when feasible, and taking advantage of natural lighting in farm buildings.

6. Develop on-farm fertilizer sources. Grow nitrogen-fixing legumes and green manure crops. Utilize marginal land in combination with more productive soils and proper management to maintain more cattle, thereby increasing beef and organic fertilizer production.

7. Work to change outmoded grading and marketing standards. Many states do not yet allow the sale of certified raw milk, more nutritious than pasteurized milk and as clean a product. In South Carolina, a lean, high-quality beef can be produced on forages alone. But right now, this meat won't grade choice. Consequently, it brings a much lower price and provides, in effect, a subsidy for corn-fed meat production.

8. Explore innovative ways to market your product.

a. Work cooperatively with the consumer by selling directly to the public. This will ensure a higher price for the farmer's goods and fresher produce for the consumer at a lower cost.

b. Organize marketing co-ops to provide restaurants, schools, and other institutions with locally-grown produce.

c. Locate marketing centers strategically for the assembly, grading, packing, and distribution of the output from many small producers, thereby providing large buyers with the volumes and specifications they require.

d. Consider small-scale processing on the farm to make products such as sausage, cured meats, pickles, preserves, cheeses, etc. Fresh produce can be washed, sorted, and packaged for sale to restaurants and markets. Dried beans, nuts, and seeds as well as honey can be sold to food stores and restaurants.

e. Investigate before planting what specific varieties of crops purchasers wish to buy by surveying bulk food purchasers in your area.

f. Sharpen marketing skills by examining price movements to forecast supply and demand. De-emphasize concentration on farm production while allowing time to think, plan, read and analyze the current market so as to obtain a better price for agricultural products.

g. Extend the availability of some produce by staggering planting and harvesting dates between the last frost date of the spring and the first frost date of the fall and by selecting varieties with varying periods of maturation.

h. Begin to work towards changing grading and marketing standards to reflect the nutritional quality of the crop rather than its uniformity and appearance.

i. Consider contracting with food processors. Contracts can benefit both farmer and processor: the farmer can be assured of a market for a bumper crop, and the processor can keep operating in a short harvest.

j. If necessary, encourage local newspapers to devote columns to farm problems and to list sources of local/seasonal foods in season.

RECOMMENDATIONS TO LOCAL GOVERNMENTS

1. Aid and encourage local food production and distribution by incorporating these goals into the local planning function and/or establishing a department to evaluate, regulate, and protect agricultural land use, encourage urban and rural food production, develop markets for local produce, initiate educational programs, and create plans to meet normal and emergency local food needs through local production and storage.

2. Preserve land for agriculture.

   a. Identify the long- and short-term costs to a township before converting any prime farmland to development use.

   b. Investigate the agricultural Land Evaluation and Site Assessment (LESA) system being developed by the Soil Conservation Service and the U.S. Department of Agriculture. The program will assist planners in identifying farmland that should be protected based on land capability, soil productivity, soil potentials, and important farmland rating. Pass local ordinances similar to one in Sterling, Wisconsin, which is successfully conserving all agricultural lands more than one acre in size with a slope greater than six percent.

3. Develop and encourage local food production by:

   a. Making publicly-owned lands that are suitable for food production available for community gardeners.

   b. Establishing urban agricultural testing programs with the state Cooperative Extension Service to test crop varieties, analyze soil for nutrients and pollutants, test crops for pollutant residues, prepare demonstration sites for various types of urban agriculture and waste recycling, and offer technical assistance on farming as well as construction of community greenhouses, cold frames, rooftop gardens, etc.

   c. Facilitating long-term leasing of vacant lots to community groups for urban gardening and providing basic site improvement.

   d. Establishing city- or county-run gardens in low income areas, and/or providing seeds, tools, and technical assistance on gardening to those receiving food stamps and other kinds of food assistance.

   e. Providing funds to establish gardens and/or greenhouses and subsidizing gardens in schools, prisons, hospitals, and nursing homes.

   f. Establishing community farms on urban fringes to be worked

by local farmers or interested community residents.

g. Promoting contract growing whereby groups of urban families, co-ops, or the city or county itself arranges to buy food directly from local farmers and processors.

h. Developing loan funds for food self-reliance projects, such as greenhouses, food preservation and storage operations, and small businesses associated with urban agriculture.

i. Encouraging city and county agencies, as well as senior citizen and day care centers, hospitals, schools, and prisons to purchase food directly from local suppliers.

j. Encouraging local industries which produce waste heat to make use of this energy by constructing greenhouses.

k. Establishing large-scale composting operations to turn vegetable, manure, and other organic wastes into compost for urban gardens.

l. Requiring garden areas in new multiple-unit housing projects.

m. Devising and implementing solar access laws for food and energy production.

4. Develop and encourage local markets by:

a. Establishing farmers' markets in towns that don't have any, particularly in low-income neighborhoods, and facilitating authorizations for farmers to accept food stamps at the markets.

b. Creating mobile farmers' markets and/or fish markets to visit housing projects, neighborhood centers, factories, and universities.

c. Assisting in the formation of food cooperatives, co-op stores, and preservation/storage centers.

5. Have county institutions purchase their food supplies from local farmers.

6. Develop and encourage local food processing and storage by:

a. Sponsoring community canning facilities where residents can preserve food inexpensively or free of charge. Several school districts in the state have recently opened community canneries.

b. Providing incentives to grocery stores to establish canning facilities for their shoppers.

7. Facilitate access to food by:

   a. implementing a "food hotline" to provide referrals for emergency food, food stamps, and meals for the elderly.

   b. Providing transportation to farmers' markets and "pick-your-own" operations.

   c. Facilitating access to food stamps, emergency food outlets, and elderly feeding programs for those in need of those services.

8. Create a greater understanding of the importance of agriculture to urban areas through educational programs. Offer seminars in urban agriculture, aquaculture, container and rooftop gardening, food preservation, storage preparation, and nutrition through adult education classes at local high schools or technical colleges.

9. Investigate land use techniques like clustering, performance controls, and transfer of development rights, which would give farmers greater options to develop either on the farm or in other areas within the community or region.

10. Establish an Agricultural Development Council. This council would focus on generating economic solutions to the problems of farmland loss in the counties. These local agricultural development councils would be comprised of people from the entire food system in the county and include farmers, processors, distributors, store managers, and farm service equipment dealers, as well as realtors and bankers. The council could develop local markets for local producers. It could survey local producers to see which ones would grow produce for local consumption and survey local stores, restaurants, and institutions to encourage them to purchase more locally grown foodstuffs. The council could also determine where local food is coming from and could promote more consumption of local foodstuffs. The council could also become involved in "farm brokeraging" which would match new farmers with those who want to sell.

RECOMMENDATIONS TO THE STATE

1. Promote agricultural production within South Carolina and nearby states by:

   a. Diversifying production, utilizing technical assistance from extension agents and low-interest state guaranteed loans to make changes necessary for diversification. Such a program could be especially beneficial if tailored to tobacco growers.

   b. Mandating a study by the Department of Agriculture and the state's two land-grant institutions of the potential for producing the various crops needed in the state, with marketing innovations to make these enterprises viable.

   c. Establishing demonstration experiments to test crop, animal, and fish varieties suited to the state's soil and climate, and develop and test low input, sustainable farming techniques suitable to South Carolina's unpredictable climate.

   d. Providing incentives for farmers to diversify.

   e. Providing tax incentives for small-scale food producers -- such as not taxing the first $10,000 of income from food produced for local consumption.

   f. Initiating a program like New England's Small Farm Management Assistance Program to provide practical farm management skills to small-scale commercial farmers on a one-to-one basis.

2. Help expand markets to assure farmers of local outlets for their products by:

   a. Setting up wholesale farmers' markets to supply retailers, consumer co-ops, and other volume purchasers.

   b. Giving preference to in-state producers in bidding for the sale of foods to state-run institutions.

   c. Continuing to assist farmers in establishing producer co-ops to facilitate bulk buying of supplies and services by volume purchasers.

   d. Establishing "good samaritan" laws whereby farmers are not held responsible for claims arising from "gleaning" -- that is, the cleaning up of fields after machines or professional pickers have finished.

   f. Facilitating and promoting direct purchase of food from

farmers by supermarkets, schools, senior citizen centers, company cafeterias, restaurants, etc.

g. Developing a joint program between commodity boards, producer associations, and the State Development Board to develop or attract a processing industry in South Carolina.

h. Providing assistance to small-scale growers through a statewide marketing clearinghouse.

i. Beginning promotional campaigns (with a specific logo to identify state-produced foods) to heighten awareness of the importance of local agriculture to the economy of South Carolina and its residents.

3. South Carolina can stop the loss of its farmland and protect its production potential by:

a. Accelerating the computerized mapping of prime farmland that should be protected from development.

b. Instituting programs for "Purchase of Development Rights," whereby a farmer who sells his development rights is paid the difference between the value of his acreage for development and its value for agriculture, thus keeping the land available for crops. Such programs would be especially useful in protecting coastal truck-crop areas from resort development.

c. Establishing agricultural districts (as is being done in New York) to protect farmland from resort development and urban expansion, and acting to prevent "leapfrog" or random development, which forces farmers to pay a disproportionate share of the new tax burden as urbanization creeps towards their farms.

d. Developing a procedure that allows the state "first refusal" rights to agricultural land being sold.

e. Providing tax incentives for farmers who voluntarily restrict development of their prime agricultural lands.

f. Instituting a farmland capital gains tax high enough to remove prime agricultural land from speculative markets.

4. Stop Erosion. The South Carolina General Assembly has recognized that soil erosion must be stopped by passing The Erosion and Sediment Reduction Act of 1983. The act requires that new regulations be proposed within one year of the date of passage (March 7, 1984). Measures that should be considered include:

a. Establishing new penalties for erosion damage such as

prohibiting all agricultural production activities which result in more than five tons of soil loss per acre per year -- the maximum rate at which the soil's fertility can be maintained. And establishing rewards for soil enrichment, such as tax credits for on-farm soil and water conservation programs, including contour tillage, minimum tillage, and crop rotation.

b. Instituting and enforcing laws that require a conservation plan for all agricultural lands in excess of 25 acres.

c. Linking economic programs -- such as loans, crop insurance, disaster relief, and state purchase of farm commodities -- to avoidance of excessive soil erosion.

d. Instituting and enforcing a "severance tax" on soil losses due to excessive erosion. Tax revenues from farms permitting rapid erosion could be used to finance subsidies to encourage conservation practices, and to pay for downstream dredging of silt, damage to water treatment facilities, and other social costs.

e. Using public subsidies, such as low interest loans, preferential farm property tax formulas and valuations, and other tax incentives to encourage regional organic waste recycling, cover and permanent cropping, minimum tillage, ridge planting, proper rotation, longer rotations, biological nitrogen fixation, contour plowing, terracing, stripcropping, leaving harvest residues on soil surfaces, reducing soil compaction, and intercropping.

f. Developing incentives for encouraging the use of rental arrangements which include provisions for sharing erosion control and soil enrichment costs with landowner.

g. Developing public awareness programs to promote understanding of the need to promote sound soil conservation practices.

i. Using performance contracts which tax farmers on their average tons of soil lost per acre per year.

5. Develop on-farm renewable energy sources by:

a. Conducting regional inventories of all renewable energy sources. Such information can be used by businesses or farmers wishing to invest in their development.

b. Providing incentives, such as tax credits for investments made in agricultural energy conservation and on-site development of renewable energy sources; or low-interest loans for accomplishing the same; or tax exemptions for income received from the production of renewable energy.

c. Setting up pilot projects and demonstration sites using alternative forms of energy for various types of farms, and showing recycling and the use of sludge.

d. Conducting a study to determine the net effect on energy vulnerability of converting some cropland to energy crops, and plan so that a proper balance can be struck.

6. Help ensure that South Carolina will have water for farming, industry, commerce and consumers by:

a. Eliminating the use of declining block rate structures, whereby the largest user of water gets charged the lowest rate. Instead, flat-rates, inclining block rates, under which the heaviest users have the highest rates, or seasonal rates can be instituted.

b. Providing investment incentives for drip irrigation and other water conservation equipment.

c. Keeping records to determine how water is used, who uses it, and in what quantities, as a first step in developing regional water use plans to balance industrial and residential development with the goal of a regional, sustainable food supply.

d. Replace "riparian law" as the basis for determining water use rights.

7. Increase the efficiency of the food system by:

a. Preparing a state-wide inventory of the types and amounts of organic wastes available now and in the future and assessing the ability of these wastes to improve soil fertility and tilth.

b. Establishing an Agricultural Waste Council in the Department of Agriculture to develop desirable legislation and other measures to facilitate recycling of wastes.

c. Developing incentives for using local organic wastes for fertilizer and incentives to industry to separate toxic substances from their waste so that it might be more safely used on cropland.

d. Setting up pilot projects and demonstration sites for recycling and the use of sludge.

8. Develop in-state food processing by:

a. Providing incentives for existing food companies to develop more energy-efficient processing and packaging techniques, along with incentives to attract new food processors who wish to reduce transportation costs by locating near a major distribution center.

b. Developing ways to facilitate contracting between farmers and processors.

c. Providing incentives for on-farm processing, cooling, and fresh packing of local food crops.

d. Helping establish community food processing and storage facilities for the use of families and small commercial food producers. In this way, economies in equipment and energy consumption can be realized.

e. Exploring ways for expanding livestock slaughtering and storage facilities.

9. Develop long-range food system plans by:

a. Developing an overall state food policy which will increase regional self-reliance and economic viability while decreasing the vulnerability of the state's food supply.

b. Developing an emergency food plan to deal with a food supply disruption. This might provide for regional grain storage facilities and the formation of state-wide communication and coordination centers.

c. Conducting an annual study of the condition of the state food system that will illustrate the amount of food currently being imported and exported, the amount of land lost to development, soil erosion losses, and what measures need to be taken to increase the state's self-reliance.

10. Develop consumer education programs to increase awareness of locally grown produce by:

a. Initiating educational programs on farmland preservation, farm energy conservation, reduced pesticide and fertilizer use, recycling of organic wastes, and energy expenditures in different methods of farming and home food production and preparation.

b. Expand nutrition education campaigns by the Cooperative Extension Service to illustrate the relationship between diet and health, as well as the benefits of fresh, seasonal, locally-grown and minimally processed foods, and the bulk purchasing of food.

c. Communicating the goals and condition of the state's food system as revealed in the state's annual study.

11. Revitalize the fishing industry by:

a. Developing more direct market systems, including inland market options for surpluses.

b. Enacting and enforcing stricter laws regulating dumping of pollutants in estuarine waters.

c. Continuing to promote aquaculture and mariculture within the state.

12. Enhance consumer and environmental safety by:

a. Strictly enforcing existing environmental protection laws.

b. Conducting a study of pesticide use practices in the state and the effects of these practices on the environment and human health; and looking at possible pesticide misuse such as spray drift and farmworker exposure to newly-sprayed fields.

c. Developing stricter standards for pesticide residues in foods.

## RECOMMENDATIONS TO THE FOOD INDUSTRY

1. Encourage sustainable farming methods by using the food industry's influence on farm production techniques to decrease the use of dangerous pesticides and increase the use of soil conservation measures. De-emphasize produce appearance while concentrating on freshness and nutritional quality.

2. Move towards regionalizing food purchasing, processing, and distribution, thereby decreasing transport costs and strengthening the local economy with increased use of local labor.

3. Promote the consumption of fresh, locally-produced food in season, enhancing consumer nutrition, and building a stronger local economy.

4. Provide nutrition education, hints for food preparation, and techniques on preserving fruits and vegetables.

5. Focus on food in a holistic way, recognizing that diet is an essential component of a healthy life and is influential in preventing as well as treating illness.

6. Grocery stores should purchase South Carolina produce and label it for consumers. Point-of-purchase literature could be made available to consumers to make them aware of where food originates and the issues involved with this.

7. Supermarket chains should open product recovery centers (such as Bi-Lo has done) for centralized handling of unsalable canned and dry foods. Such centers not only allow for more effective control of losses, but also facilitate the donation of food to food banks or other non-profit agencies.

## RECOMMENDATIONS TO THE AGRICULTURAL RESEARCH COMMUNITY

1. Determine the optimal mix of farm types in South Carolina to obtain sustainable yields of both crops and livestock to meet the state's consumption needs and to provide a sufficient level of exports.

2. Assess relationships between biofuels development (including forest resources) and long-term soil productivity to provide guidelines for future programs.

3. Investigate how to improve the capability of using forage and South Carolina crop wastes.

4. Institute a small-scale-agriculture research program at Clemson and South Carolina State. This will not only aid small-scale enterprises, but will also help large-scale farms diversify and become less dependent upon a single commodity. Such a program would focus on such things as the need for smaller equipment which would use less energy and reduce soil compaction and erosion; fruits and vegetables and post-harvest handling methods to benefit small-scale producers; livestock and forage research programs aimed at smaller enterprises; and beef feeding systems based on forages rather than high energy grains.

5. Investigate perennial agriculture systems (permaculture) appropriate to South Carolina to eliminate annual soil disturbance and decrease energy, fertilizer, pesticide and herbicide usage.

6. Determine the long-term effects of recommended applications of chemical fertilizers, pesticides, and herbicides on the productivity of selected South Carolina soils.

7. Conduct an inventory of organic wastes in South Carolina which are available to improve soil fertility and tilth.

8. Investigate methods to utilize South Carolina municipal wastes in agriculture.

9. Develop crop varieties adaptable to low-input farming systems in South Carolina.

10. Set up trial plots to study the transition phase of switching from conventional to low-input farming systems.

11. Examine ways to make food distribution and marketing systems more accessible to local and regional food producers.

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## APPENDIX I

## SOUTH CAROLINA FOOD SYSTEM ORGANIZATIONS

There are many organizations which directly or indirectly are working towards developing a sustainable food system in South Carolina. Among those listed under "Consumers" are organizations which provide information about starting home gardens, food co-ops, farmers' markets, land trusts, community gardens, and food assistance programs, and which foster awareness about land use and environmental issues relating to the food system, especially farmland preservation. Listed under "Farmers" are those groups which promote a specific kind of farming and which offer planning services for evaluating the different options farmers have for the future use of their land. Those mentioned under "Food Industry" serve as a guide to certain major organizations dealing with different aspects of the state's food industry -- producing, processing, marketing, and distribution. Readers are encouraged to learn about the services of the different groups and where appropriate, to join with them. Our food system will change much faster as more people participate.

## FARMERS

1. Agriculture Commission of S.C.
Mr. Laurie Lawson, Chairman
Darlington, SC 29532

2. Blackville Marketing Authority
Joe Bates, President
Blackville, SC 29817

3. Bluffton Oyster Cooperative
Floyd Miller, Manager
Bluffton, SC 29910
(803) 757-2950

4. Carolina Cotton Ginners Assn.
Mr. Robert Tucker, Exec. Secretary
% S.E. Cotton Ginners Assn.
P.O. Box 686
Dahlonega, GA 30533

5. Carolina Farm & Power Dealer's Association
Ed Biggs, Exec. Vice President
P.O. Drawer 3776
Wilson, NC 27893

6. Carolina Cotton Growers Assn.
Jack E. Cox
P.O. Box 1269
Raleigh, NC 27602

7. Central Milk Producers Assn.
J.P. Butler, President
Rt. 2
Saluda, SC 29838
(803) 445-3718

8. Coble Dairy Products Coop.
Norman J. Crouch, President
Box 629
Lexington, NC 27292
(704) 249-9931

9. Columbia Bank for Cooperatives
Mr. Richard W. Bonney, Jr., Pres.
P.O. Box 1493
Columbia, SC 29202

10. Dairymen, Inc.,
Carolina Districts
Ollie Wood, Div. Manager
Box 16024
Greensboro, NC 27406
(919) 272-5195

11. Darlington County Marketing Authority
Gary E. Byrd Jr., President
Rt. 1
Hartsville, SC 29550

12. Dorchester Marketing Assn.
T.F. Berry, President
Reesville, SC 29471

13. FCX, Inc.
Marvin McClam, Pres. & Gen. Mgr.
P.O. Box 2419
Raleigh, NC 27602
(919) 833-0365

14. Farmers Cooperative Assn.
Tom Clark Sr., President
Marion, SC 29571

15. Gold Kist, Inc.
W.W. Gaston, President
Box 2210
Atlanta, GA 30301
(404) 393-5087

16. Greenwood Cooperative Marketing Assn.
Gale Kinney, Exec. Vice Pres.
Jeff Evans, Manager
1014 Reynolds St.
Greenwood, SC 29646
(803) 223-2025

17. Long Creek Marketing Authority
Ray Phillips, President
Rt. 1.
Mountain Rest, SC 29664

18. Naturaland Trust
P.O. Box 10207
Greenville, SC 29603

19. The Nature Conservancy
South Carolina Chapter
P.O. Box 5475
Columbia, SC 29250

20. Pesticide Association of S.C.
Mr. Charlie Thomas
300 Highland
Clemson, SC 29631

21. Production Credit Association
Mr. Reynolds Wilburn
6521 Crosfield Rd.
Columbia, SC 29206

22. Ridge Peach & Vegetable Assn.
Joe Cal, Manager
Ridge Spring, SC 29129

23. S.C. Agronomy Society
J.P. Zublena, Secretary
P.O. Box 5809
Florence, SC

24. S.C. Apple Growers Assn.
Mr. David Necker, President
Rt. 1
Campobello, SC 29322

25. S.C. Cattlemen's Association
Bill Heard, President
P.O. Box 572
Greenwood, SC 29646

26. S.C. Crabbers Association
Charles A. Caul Sr.
6D Jefferson Dr.
Beaufort, SC 29902
(803) 524-6348

27. S.C. Electric Cooperative Association
Al Ballard, Exec. Vice Pres.
Box 145
Cayce, SC 29033
(803) 796-6060

28. S.C. Equipment Dealers Association
Billy Altman
1808 E. Pamplico Hwy.
Florence, SC 29501

29. S.C. Farm Bureau
Harry Bell, President
724 Knox Abbott Dr.
Columbia, SC 29166

30. S.C. Farm Bureau Market Assn.
Ray Segars, President
Oswego, SC 29121

31. S.C. Association of Farm Managers & Rural Appraisers
D.B. Smith, Secretary
291 Barre Hall
Clemson University
Clemson, SC 29631

32. S.C. Farmer Cooperative Council
R.D. Steer, Exec. Secretary
P.O. Box 516
Greenwood, SC 29646

33. S.C. Foundation Seed Assn.
R.H. Garrison
Room C-277 P&AS Bldg.
Clemson University
Clemson, SC 29631

34. S.C. Heritage Trust Program
P.O. Box 167
Columbia, SC 29202

35. S.C. Milk Producers League
J.M. Eaddy, President
Rt. 3
Manning, SC 29102

36. S.C. Peach Growers Association
Jim Crowley
P.O. Box 225
Gramling, SC 29348

37. S.C. Plant Food Educational Society
R. Jerry Hewitt
Royster Company
P.O. Box 807
Florence, SC 29501

38. S.C. Pork Producers Association
W.W. McElmurry, President
Rt. 1
Jackson, SC 29851

39. S.C. Sheep Producers Association
Diane Dubose
Rt. 1, Box 108
Rembert, SC 29218

40. S.C. Shrimpers Association
William Gay
St. Helena Island
Beaufort, SC 29902
(803) 838-3495

41 S.C. Soybean Association
Jim Devers, President
c/o Nichols Farm Supply
Nichols, SC 29581

42. S.C. Tomato Association
Terry Reynolds, Exec. Secretary
P.O. Box 13363
Columbia, SC 29201
(803) 758-3531

43. S.C. Tomato Growers Association
John Walpole, President
Wadmalaw Island, SC 29487

44. S.C. Watermelon Growers & Handlers Association
Terry Reynolds
P.O. Box 13363
Columbia, SC 29201
(803) 758-3531

45. Southeastern Livestock Export
Roy Copelan Jr., Exec. Secretar
Box 11280
Columbia, SC 29201
(803) 758-3531

46 Southeastern Pecan Growers Association
Sarah Hines, Secretary
1104 Friartuck Rd.
Starkville, MS 39759

47. Tri-County Cattlemen's Assn.
Richard Ashely, Secretary
Box 10941
Rock Hill, SC 29730
(803) 328-1827

48. Foothills Direct Marketing Association
Horace Skipper, Secretary
Rt. 1, Box 710
Six Mile, SC 29682
(803) 868-9275

CONSUMERS

1. Common Cause/South Carolina
   1313 Elmwood Ave.
   P.O. Box 7021
   Columbia, SC 29202

2. Grass Roots Organizing Workshop
   18 Bluff Rd.
   Columbia, SC 29201

FOOD INDUSTRY

1. Food Retailers Association of South Carolina
   936 Stadium Rd.
   Columbia, SC 29201

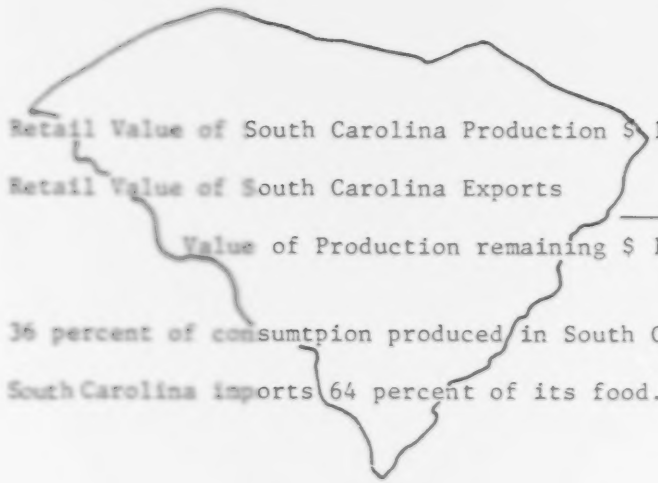
APPENDIX II

South Carolina Food Chart

South Carolina, with its diverse climate and topography and relatively small population, has the potential to produce a large share of the foods its residents consume. Yet 64 percent of the food consumed in the state is imported from other states and countries. Transportation for this imported food costs South Carolina's consumers $77 million every year. Meanwhile, plagued by drought and falling commodities prices, 35 to 40 percent of South Carolina's farmers are struggling to stay on the land, with up to 8,000 farmers on the verge of bankruptcy in 1983.

Unnecessary food imports deprive the state of valuable income, not only for farmers, but also for food processors, agricultural machinery dealers, and other food and agriculture related industries. Increased local production for local consumption would provide the state's consumers with a secure supply of nutritious food.

By increasing and diversifying in-state food production and processing for local consumption, South Carolina's residents can improve their state's food self-reliance. Careful management of the state's soil, water and forest resources will assure the success of the food and agriculture system for future generations.



| | |
|---|---|
| Retail Value of South Carolina Production | $ 1,543,190,080 |
| Retail Value of South Carolina Exports | 426,853,010 |
| Value of Production remaining | $ 1,116,337,070 |

36 percent of consumtpion produced in South Carolina

South Carolina imports 64 percent of its food.

SOUTH CAROLINA FOOD IMPORTS

| COMMODITY | PRODUCTION Retail Wt(a) (1,000 lbs) | PRODUCTION Retail Value(b) ($1,000) (1982 $) | CONSUMPTION Retail Wt(c) (1,000 lbs) | CONSUMPTION Retail Value ($1,000) (1982 $) | % Import | Retail Value of Import ($1,000) | % Export | Retail Value of Export ($1,000) | Area required to produce 100% of SC Consumption |
|---|---|---|---|---|---|---|---|---|---|
| Meats | | | | | | | | | |
| Beef | 51,654.71 | 413,186.86 | 241,018.40 | 668,103.00 | 78.60 | 524,916.14 | | | 1,807,638.00(d) |
| Veal | 7,080.30 | 23,223.38 | 4,995.20 | 16,384.26 | | | 29.45 | 6,839.12 | e. |
| Lamb & Mutton | NC. | | 4,370.80 | 20,367.93 | | | | | 3,185.42 |
| Pork | 79,998.10 | 115,197.26 | 202,930.00 | 292,219.20 | 60.6 | 117,021.94 | | | 568,204.00(d) |
| Offals | NC. | | 29,346.80 | 26,412.12 | | | | | |
| Poultry | | | | | | | | | |
| Chicken | 131,253.84 | 89,252.61 | 161,407.40 | 109,757.03 | 18.70 | 20,504.42 | | | 390,184.41(f) |
| Turkey | 48,552.80 | 44,183.05 | 33,405.40 | 30,398.91 | | | 31.20 | 13,784.14 | 31,438.48(f) |
| Ducks & Geese | NC. | | 1,248.80 | 1,735.83 | | | | | NC. |
| Eggs | 215,280.00 | 119,408.64 | 104,899.20 | 58,184.09 | | | 51.30 | 61,224.55 | 85,032.24(f) |
| Fish(g) | | | | | | | | | |
| Fresh & Frozen | | | | | | | | | |
| Offshore | 4,068.00 | | | | | | | | |
| Freshwater | 729.00 | | | | | | | | |
| Estuarine | 677.00 | | | | | | | | |
| total finfish | 5,474.00 | 9,524.76 | 15,610.00 | 27,161.40 | 65.00 | 17,636.64 | | | 84,901.56(h) |
| Shrimp | 3,326.00 | | | | | | | | |
| Crabs | 6,321.00 | | | | | | | | |
| Oysters | 500.00 | | | | | | | | |
| Clams | 522.00 | | | | | | | | |
| Whelks | 33.00 | | | | | | | | |
| total shellfish | 10,702.00 | 44,413.30 | 8,741.60 | 36,227.64 | 18.32 | 8,135.66 | | | 12,148.26(i) |
| Canned | | | | | | | | | |
| Salmon | NC. | | 1,561.00 | 3,543.47 | | | | | |
| Sardines | NC. | | 1,248.80 | 3,171.95 | | | | | |
| Tuna | NC. | | 9,678.20 | 15,388.34 | | | | | |
| Shellfish | NC. | | 1,561.00 | 10,833.34 | | | | | 2,169.33(i) |
| other | NC. | | 936.60 | 3,737.03 | | | | | 210.00(j) |
| Cured | NC. | | 1,248.80 | 724.26 | | | | | |
| Dairy | | | | | | | | | k. |
| Fluid Milk & Cream | 568,000.00 | 163,016.00 | 456,436.00 | 130,997.25 | | | 19.64 | 32,018.75 | 110,735.54(m) |
| Other Dev. Milk(n) | | | 31,063.90 | 7,765.97 | 100.00 | 7,765.97 | | | 10,654.56 |

SOUTH CAROLINA FOOD IMPORTS

| COMMODITY | PRODUCTION Retail Wt(a) (1,000 lbs) | PRODUCTION Retail Value(b) ($1,000) (1982 $) | CONSUMPTION Retail Wt(c) (1,000 lbs) | CONSUMPTION Retail Value ($1,000) (1982 $) | % import | Retail Value of Import ($1,000) | % Export | Retail Value of Export ($1,000) | Area required to produce 100% of SC Consumption |
|---|---|---|---|---|---|---|---|---|---|
| Butter | -0-. | | 13,424.60 | 28,567.55 | 100.00 | 28,567.55 | | | 70,681.84 |
| Cheese, American | -0-. | | 31,532.20 | 60,541.82 | 100.00 | 60,541.82 | | | 90,124.57 |
| other | -0-. | | 25,288.20 | 61,113.15 | 100.00 | 61,113.15 | | | NC. |
| Cottage | -0-. | | 13,736.80 | 11,538.91 | 100.00 | 11,538.91 | | | 10,547.90 |
| total | -0-. | | 70,557.20 | 161,761.43 | 100.00 | 161,761.43 | | | |
| Evap. whole milk | -0-. | | 9,053.80 | 3,259.37 | 100.00 | 3,259.37 | | | 9,275.96 |
| Evap. & Cond. skim | -0-. | | 10,614.80 | 6,262.73 | 100.00 | 6,262.73 | | | 9,041.69 |
| Cond. whole sweet | -0-. | | 936.60 | 1,245.68 | 100.00 | 1,245.68 | | | 1,035.93 |
| " " unsweet | | | 2,809.80 | NC. | 100.00 | | | | 2,878.74 |
| total | | | 23,415.00 | NC. | 100.00 | | | | |
| Frozen dairy products | | | | | | | | | 51,837.26 |
| Ice Cream | NC. | | 53,698.40 | 50,798.69 | | | | | 761.14 |
| Sherbert | NC. | | 4,058.60 | 1,420.51 | | | | | 13,111.78 |
| Ice Milk | NC. | | 21,854.00 | 9,397.22 | | | | | NC. |
| other | NC. | | 936.60 | NC. | | | | | NC. |
| Mellorine | NC. | | 936.60 | NC. | | | | | |
| total | 13,902.00 | NC. | 81,482.20 | | 82.94 | | | | |
| Vegetables, fresh | | | | | | | 76.23 | 78,998.74 | 1,037.61(n) |
| Tomatoes | 148,400.00 | 103,583.20 | 35,278.60 | 28,624.46 | | | | | 644.76 |
| Broccoli | insignif. | | 5,931.80 | 6,524.98 | 99.88 | 6,459.73 | | | 731.86 |
| Carrots | insignif. | | 19,668.60 | 7,434.73 | 99.00 | 7,360.83 | | | 139.79 |
| Escarole | insignif. | | 1,873.20 | 768.01 | 99.00 | 760.33 | | | 1,085.91 |
| Green Peppers | insignif. | | 9,990.40 | 9,440.93 | 99.00 | 9,346.52 | | | 283.82 |
| Spinach | insignif. | | 2,497.60 | 4,195.97 | 99.00 | 4,154.01 | | | NC. |
| Minor dk gr/yel | insignif. | | 8,117.20 | 7,954.86 | 99.00 | 7,875.31 | | | NC. |
| Artichokes | -0-. | | 1,561.20 | 702.54 | 100.00 | 702.54 | | | 686.15 |
| Asparagus | -0-. | | 936.60 | 1,788.91 | 100.00 | 1,788.91 | | | 431.77 |
| Snap Beans | 7,896.00(o) | 5,906.21 | 4,058.60 | 3,035.83 | | | 48.60 | 2,870.38 | 768.47 |
| Cabbage | 3,348.80* | 971.15 | 23,727.20 | 6,880.89 | 85.89 | 5,910.00 | | | 576.89 |
| Cauliflower | -0-. | | 5,307.40 | 530.74 | 100.00 | 530.74 | | | 483.41 |
| Celery | -0-. | | 22,418.40 | 10,227.67 | 100.00 | 10,227.67 | | | 3,393.48 |
| Corn | 2,885.90* | | 20,293.00 | 88,477.48 | 85.78 | 75,895.98 | | | 1,391.33 |
| Cucumbers | 26,275.20(o) | 13,636.83 | 12,800.20 | 6,643.30 | | | 51.20 | 6,993.53 | 89.40 |
| Eggplant | NC. | | 1,561.00 | 1,311.24 | | | | | NC. |
| Garlic | -0-. | | 1,873.20 | 3,690.20 | 100.00 | 3,690.20 | | | 2,526.60 |
| Lettuce | -0-. | | 74,303.60 | 42,873.18 | 100.00 | 42,873.18 | | | 1,371.56 |
| Onions & Shallots | NC. | | 28,722.40 | 10,139.01 | | | | | |

SOUTH CAROLINA FOOD IMPORTS

| COMMODITY | PRODUCTION | | CONSUMPTION | | | | | | Area required to produce 100% of SC Consumption |
|---|---|---|---|---|---|---|---|---|---|
| | Retail Wt(a) (1,000 lbs) | Retail Value(b) ($1,000) (1982 $) | Retail Wt(c) (1,000 lbs) | Retail Value ($1,000) (1982 $) | % Import | Retail Value of Import ($1,000) | % Export | Retail Value of Export ($1,000) | |
| other minor | insignif. | | 22,166.20 | NC. | | | 59.33 | 746.86 | NC. |
| Pumpkin & Squash | 3,070.30* | 1,258.83 | 1,248.80 | 512.01 | | | | | 87.39 |
| Potatoes, white | insignif. | | 147,046.20 | 41,172.94 | 99.00 | 40,761.21 | | | 7,658.66(p) |
| Potatoes, sweet | 45,000.00 | 18,000.00 | 9,990.40 | 3,996.16 | | | 77.80 | 14,003.84 | 799.23 |
| Lima Beans | 1,085.30* | 1,041.89 | 916.60 | 900.57 | | | 13.70 | 141.32 | 335.99 |
| Beets | NC. | | 3,746.40 | 2,622.48 | | | | | 201.42 |
| Peas | insignif. | | 9,366.00 | 5,151.30 | 99.00 | 5,099.79 | | | 4,927.47 |
| Vegetables, frozen | | | | | | | | | n. |
| Brussels Sprouts | NC. | | 905.38 | 1,004.97 | | | | | 4,013.88 |
| Broccoli | NC. | | 4,745.44 | 4,840.34 | | | | | 631.14 |
| Carrots | NC. | | 3,246.88 | 3,084.54 | | | | | 206.54 |
| Spinach | NC. | | 2,341.50 | 1,709.29 | | | | | 334.83 |
| Minor - gr/yel | NC. | | 874.16 | 926.61 | | | | | 116.26 |
| Asparagus | NC. | | 187.32 | 71.81 | | | | | 239.77 |
| Snap Beans | NC. | | 3,496.64 | 3,321.81 | | | | | 412.60 |
| Cauliflower | NC. | | 1,748.32 | 2,312.95 | | | | | 250.01 |
| Corn | NC. | | 6,462.54 | 5,622.41 | | | | | 1,720.24 |
| Onions & Shallots | NC. | | 2,185.40 | 1,660.90 | | | | | 73.57 |
| Other minor | NC. | | 2,778.58 | NC. | | | | | 327.87 |
| Lima Beans | NC. | | 1,561.00 | 1,685.88 | | | | | 81.95 |
| Peas | NC. | | 4,839.10 | 4,161.63 | | | | | 2,637.31 |
| Potatoes | NC. | | 56,820.00 | 83,558.82 | | | | | 7,102.55 |
| Potatoes, chips & etc | NC. | | 12,800.20 | 30,720.48 | | | | | 2,611.28 |
| dehydrated | NC. | | 4,683.00 | NC. | | | | | 32.78 |
| dry beans | -0-. | | 12,800.20 | 3,584.06 | 100.00 | 3,584.06 | | | NA. |
| dry field peas | 482.10* | 183.20 | 1,248.50 | 474.54 | 61.39 | 291.35 | | | 260.17 |
| Vegetables, Canned | | | | | | | | | |
| Lima Beans | NC. | | 936.60 | 515.13 | | | | | 304.88 |
| Tomatoes | NC. | | 19,069.20 | 10,569.53 | | | | | 739.39 |
| Asc process | NC. | | 36,215.20 | 17,383.30 | | | | | 1,406.05 |
| pulp & puree | NC. | | 2,809.80 | 1,994.96 | | | | | 109.09 |
| juice | NC. | | 5,619.60 | 2,136.31 | | | | | 218.18 |
| other | NC. | | 1,248.80 | NC. | | | | | 48.48 |
| Potatoes, white | NC. | | 3,434.20 | 1,030.26 | | | | | 171.71 |
| Potatoes, sweet | NC. | | 2,809.80 | 1,994.96 | | | | | 140.49 |

SOUTH CAROLINA FOOD IMPORTS

| COMMODITY | PRODUCTION Retail Wt(a) (1,000 lbs) | PRODUCTION Retail Value(b) ($1,000) (1982 $) | CONSUMPTION Retail Wt(c) (1,000 lbs) | CONSUMPTION Retail Value ($1,000) (1982 $) | % Import | Retail Value of Import ($1,000) | % Export | Retail Value of Export ($1,000) | Area required to produce 100% of SC Consumption |
|---|---|---|---|---|---|---|---|---|---|
| Carrots | NC. | | 1,248.80 | 487.03 | | | | | 58.26 |
| Spinach | NC. | | 1,561.00 | 718.06 | | | | | 140.65 |
| Minor gr/yel | NC. | | 1,561.00 | 593.18 | | | | | NC. |
| Asparagus | NC. | | 936.60 | 1,217.58 | | | | | 761.77 |
| Snap Beans | NC. | | 1,654.60 | 5,625.84 | | | | | 1,178.12 |
| Cabbage | NC. | | 2,185.40 | 764.89 | | | | | 121.89 |
| Corn | NC. | | 15,922.20 | 7,005.77 | | | | | 3,582.49 |
| Cucumbers | 104,500.00(h) | 47,025.00 | 23,012.00 | 10,355.40 | | | 77.98 | 36,669.60 | 2,092.07(h) |
| Beets | NC. | | 3,746.40 | 1,386.17 | | | | | 241.64 |
| Peas | NC. | | 9,366.00 | 3,465.42 | | | | | 3,460.74 |
| Pumpkin & Squash | NC. | | 1,248.80 | 512.01 | | | | | 236.83 |
| Fruits, fresh | | | | | | | | | |
| Apples | 5,760.00 | 3,864.96 | 62,440.00 | 41,897.24 | 90.77 | 38,032.28 | | | 47,664.12 |
| Apricots | insignif. | | 312.20 | 16.23 | 99.00 | 16.07 | | | NC. |
| Avocados | -0-. | | 5,619.60 | 7,024.50 | 100.00 | 7,024.50 | | | NA. |
| Bananas | -0-. | | 67,123.00 | 24,365.65 | 100.00 | 67,123.00 | | | NA. |
| Cherries | insignif. | | 1,561.00 | 2,043.35 | 99.00 | 2,022.92 | | | NA. |
| Cranberries | -0-. | | 312.20 | NC. | | | | | NA. |
| Grapes | 4,814.89(i) | 4,699.33 | 9,990.40 | 9,750.63 | 51.80 | 5,051.30 | | | 3,264.84 |
| Nectarines | NC. | | 4,683.00 | 6,368.88 | | | | | NC. |
| Papaya | -0-. | | 62.44 | NC. | 100.00 | | | | NA. |
| Peaches | 197,400.00 | 132,060.60 | 16,546.60 | 11,069.67 | | | 91.62 | 120,990.93 | 1,323.73 |
| Pears | NC. | | 8,429.40 | 5,554.97 | | | | | NC. |
| Pineapples | -0-. | | 4,683.00 | 117.07 | 100.00 | 117.07 | | | NA. |
| Plums/Prunes | insignif. | | 5,307.40 | 7,908.03 | 100.00 | 7,908.03 | | | 758.20 |
| Strawberries | 871.60 | 886.42 | 6,556.20 | 6,667.65 | 86.70 | 5,781.23 | | | 728.47 |
| Citrus | -0-. | | 74,928.00 | 33,717.60 | 100.00 | 33,717.60 | | | NA. |
| Fruits, Canned & Chilled | | | | | | | | | |
| Apples/Sauce | NC. | | 6,556.20 | 2,229.11 | | | | | 9,303.80 |
| Apricots | NC. | | 1,248.80 | 911.62 | | | | | NC. |
| Berries | NC. | | 312.20 | 433.96 | | | | | 33.72 |
| Cherries | NC. | | 2,497.60 | 2,947.17 | | | | | NC. |
| Cranberries | NC. | | 2,185.40 | 1,311.24 | | | | | NC. |
| Salad & Cocktail | NC. | | 7,180.69 | 5,672.67 | | | | | NC. |
| Peaches | NC. | | 11,239.20 | 6,406.34 | | | | | 1,106.64 |
| Pears | NC. | | 4,995.20 | 3,296.83 | | | | | NC. |
| Pineapples | -0-. | | 9,366.00 | 4,776.66 | | | | | NA. |
| Plums/Prunes | NC. | | 624.40 | 26.22 | | | | | 502.68 |
| Olives | -0-. | | 3,122.00 | 9,490.88 | | | | | NA. |

SOUTH CAROLINA FOOD IMPORTS

| COMMODITY | PRODUCTION Retail Wt(a) (1,000 lbs) | PRODUCTION Retail Value(b) ($1,000) (1982 $) | CONSUMPTION Retail Wt(c) (1,000 lbs) | CONSUMPTION Retail Value ($1,000) (1982 $) | % Import | Retail Value of Import ($1,000) | % Export | Retail Value of Export ($1,000) | Area required to produce 100% of SC Consumption |
|---|---|---|---|---|---|---|---|---|---|
| Citrus Sections | -0-. | | 2,185.40 | 1,311.24 | | | | | NA. |
| Canned & Chilled Fruit Juices | | | 20,168.00 | 5,042.03 | | | | | 20,993.88 |
| Apple | NC. | | 2,185.40 | 2,167.53 | | | | | NC. |
| Fruit nectars | NC. | | 2,091.74 | 899.45 | | | | | 2,585.30 |
| Grape | NC. | | 4,214.70 | 1,601.59 | | | | | NA. |
| Pineapple | -0-. | | 2,903.46 | 1,335.59 | | | | | 573.63 |
| Prune | NC. | | 11,426.52 | 16,111.39 | | | | | NA. |
| Orange | -0-. | | 1,529.78 | 504.83 | | | | | NA. |
| Grapefruit | -0-. | | | | | | | | |
| Frozen Fruits | | | 124.88 | 212.30 | | | | | 50.04 |
| Blackberries | NC. | | 374.64 | 981.56 | | | | | NA. |
| Raspberries | NC. | | 3,996.16 | 6,154.09 | | | | | 395.17 |
| Strawberries | NC. | | 561.96 | 1,005.90 | | | | | 263.09 |
| Blueberries | NC. | | 1,186.36 | NC. | | | | | 1,512.38 |
| Apples | NC. | | 156.10 | NC. | | | | | NC. |
| Apricots | NC. | | 1,404.90 | 1,952.81 | | | | | NA. |
| Cherries | NC. | | 62.44 | NC. | | | | | 24.08 |
| Grapes & Pulp | NC. | | 405.86 | 726.40 | | | | | NC. |
| Misc. | NC. | | 30,564.38 | NC. | | | | | NA. |
| Citrus | -0-. | | | | | | | | |
| Fruits, Dried | | | 437.08 | 1,000.91 | | | | | 2,669.19 |
| Apples | NC. | | 124.88 | 545.72 | | | | | NC. |
| Apricots | NC. | | 593.18 | 2,188.83 | 100.00 | 2,188.83 | | | NA. |
| Dates | -0-. | | 374.64 | 1,030.26 | 100.00 | 1,030.26 | | | 1,123.92 |
| Figs | insgnft. | | 62.44 | 206.05 | | | | | 32.37 |
| Peaches | NC. | | 1,123.92 | 1,258.79 | | | | | 417.46 |
| Prunes | NC. | | 4,745.44 | 8,446.88 | | | | | 7,164.68 |
| Raisins | NC. | | | | | | | | |
| Watermelons | 161,000.00 | 43,470.00 | 34,634.20 | 9,351.23 | | | 78.49 | 34,118.77 | 1,540.19(p) |
| Canteloups | 47,250.00(o) | 25,515.00 | 24,663.80 | 13,318.45 | | | 47.80 | 12,196.55 | 6,324.05 |
| Fats & Oils | | | 1,342.46 | 26,043.72 | | | | | |
| Butter | NC. | | 34,966.40 | 15,385.22 | | | | | |
| Margarine | NC. | | | | | | | | |

SOUTH CAROLINA FOOD IMPORTS

| COMMODITY | PRODUCTION Retail Wt(a) (1,000 lbs) | PRODUCTION Retail Value(b) ($1,000) (1982 $) | CONSUMPTION Retail Wt(c) (1,000 lbs) | CONSUMPTION Retail Value ($1,000) (1982 $) | % Import | Retail Value of Import ($1,000) | % Export | Retail Value of Export ($1,000) | Area required to produce 100% of SC Consumption |
|---|---|---|---|---|---|---|---|---|---|
| lard | 6,522.92 | 3,261.46 | 7,805.00 | 3,902.50 | 16.43 | 641.04 | | | p. |
| Shortening | NC. | | 57,757.00 | 42,797.94 | | | | | |
| other | NC. | | 73,367.00 | NC. | | | | | NC. |
| Grains | | | | | | | | | 232,571.66 |
| Wheat Flour | 215,217.39 | 55,956.52 | 364,025.20 | 94,646.55 | 40.80 | 38,690.03 | | | 8,676.56 |
| Cereal | NC. | | 9,053.80 | 18,741.37 | | | | | |
| Rye Flour | 5,986.99 | 2,215.19 | 2,185.40 | 808.60 | | | 63.50 | 1,406.59 | 2,118.89 |
| Rice | -0-. | | 34,342.00 | 14,286.27 | 100.00 | 14,286.27 | | | NC. |
| Corn Flour/Meal | 54,227.85 | 16,268.35 | 23,415.00 | 7,024.50 | 56.82 | 9,243.85 | | | 8,221.27 |
| Cereal | NC. | | 7,180.60 | 7,775.05 | | | | | 3,709.98 |
| Starch | NC. | | 5,931.80 | 4,092.94 | | | | | 1,917.95 |
| Hominy & Grits | NC. | | 12,800.20 | 3,200.05 | | | | | 4,977.86 |
| Oatmeal | 3,815.79 | 2,213.16 | 9,678.20 | 5,613.36 | 60.57 | 3,400.20 | | | 12,681.77 |
| Barley | 803.92 | 651.17 | 3,746.40 | 3,034.58 | 78.54 | 2,383.41 | | | 3,671.47 |
| Nuts | | | | | | | | | |
| Almonds | -0-. | | 1,592.22 | 6,770.50 | 100.00 | 6,770.50 | | | NC. |
| Filberts | -0-. | | 156.10 | NC. | | | | | q. |
| Pecans | 2,000.00 | 9,560.35 | 1,186.36 | 5,671.01 | | | 40.68 | 3,889.34 | 1,186.36 |
| Walnuts | -0-. | | 1,685.88 | 6,113.10 | 100.00 | 6,113.10 | | | NC. |
| Macadamias | -0-. | | 124.88 | 478.28 | 100.00 | 478.28 | | | NC. |
| Others | NC. | | 1,030.26 | 5,043.49 | | | | | NC. |
| Coconuts | -0-. | | 1,248.80 | 1,905.92 | 100.00 | 1,905.92 | | | NA. |
| Peanuts (shelled) | 16,680.00 | 29,779.92 | 19,044.20 | 34,000.88 | 12.41 | 4,220.96 | | | 7,167.68 |
| Spices, Herbs | | | | | | | | | |
| Pepper | NC. | | 936.60 | 561.96 | | | | | NC. |
| Mustard Seed | NC. | | 1,873.20 | 15,753.61 | | | | | NC. |
| other | NC. | | 2,809.80 | NC. | | | | | NC. |
| All Sugars | Insignif. | | 437,080.00 | 142,488.08 | 99.00 | 141,063.20 | | | NC. |
| Honey | NC. | | 3,122.00 | 1,342.46 | | | | | NC. |
| edible syrups | NC. | | 1,248.80 | 424.59 | | | | | NC. |
| Coffee | -0-. | | 24,039.40 | 60,314.85 | 100.00 | 60,314.85 | | | NA. |
| Tea | -0-. | | 2,497.60 | 9,915.47 | 100.00 | 9,915.47 | | | NA. |
| Cocoa | -0-. | | 9,053.80 | 34,042.29 | 100.00 | 34,042.29 | | | NA. |
| TOTAL | 2,219,240.62 | 1,543,190.08 | 4,033,845.58 | 3,092,140.96 | | 1,448,861.86 | | 426,853.01 | 3,717,311.74 |

FOOD IMPORT CHART NOTES

a. Production figures are taken from South Carolina State & County Livestock and Poultry Statistics (June 1983), and South Carolina Crop Statistics -- State and County Data, 1981-1982, South Carolina Crop and Livestock Reporting Service, using USDA conversion factors. *Production statistics for squash, sweet corn, lima beans, cabbage and dry field peas from South Carolina Vegetable Statistics -- State and County Data, 1983 Crop Year, (April 1984), South Carolina Crop and Livestock Reporting Service.

b. Retail values are taken from U.S. Department of Labor, Bureau of Labor Statistics, and the following stores: Winn Dixie and Ingles, Clemson; Bi-Lo, Pendleton; Kroger, Anderson. January, 1984, prices were converted to 1982 prices by obtaining the purchasing power of the 1982 U.S. dollar, Bureau of Labor Statistics.

c. Per capita consumption statistics were taken from Food Consumption, Prices and Expenditures, USDA Statistical Bulletin No. 672 (1981), and multiplied by South Carolina's population, 3,122,000 (1980).

d. Personal communication with D.L. Cross, professor of Animal Science, Clemson University.

e. Byproduct of the dairy industry.

f. Land requirements estimated by John Welter, professor of poultry science, Clemson University.

g. Fishery production figures for 1982 were provided by South Carolina Wildlife and Marine Resources Department from their annual report now in print.

h. Based on experimental yields of 183.86 lbs./acre for various brackish water and marine fishes in South Carolina, from Aquaculture: The Farming and Husbandry of Freshwater and Marine Organisms, Bardach, John E. et. al., eds. (New York: John Wiley & Sons, 1972). Yields of up to 2,000 lb./acre can be expected for catfish culture in S.C. (D.L. Robinette, Channel Catfish Production in Ponds, Clemson Univ. Cooperative Extension Service, Clemson, S.C., July 1981). Two-

thirds of the state offers soil and thermal characteristics considered average or above average for warmwater fish culture (S.C. Agricultural Experiment Station Circular 192, March 1983, Freshwater Aquacultural Resources in S.C.).

i. Based on experimental yields of Florida shrimp cited in Bardach, et. al.

j. Ibid, experimental oyster yields.

k. Land requirements for dairy products calculated using whole milk equivalents from Conversion Factors and Weights and Measures, USDA, 1980; figures may be high due to double counting.

l. Lowfat, skim, buttermilk, and flavored milk drinks.

m. Dairy land requirements based on 2.79 acres per cow (table 6, Characteristics of S.C. Dairy Farms 1980, South Carolina Agricultural Experiment Station Circular 191, July 1982), and 11,500 lb. per cow per year (S.C. Livestock and Poultry Statistics, (July 1982).

n. Acreages based on projected yields for S.C. from D.O. Ezell, "Vegetable Situations in S.C.," table 1.2, in Potential for Commercial Production, Marketing and Canned/Frozen Processing of Produce in South Carolina, Clemson University Cooperative Extension Service Bulletin 127, January 1982; and actual yields from Vegetables -- 1981 Annual Summary, Statistical Reporting Service, Vg2-2.

o. Estimated by Wilton Cook, associate professor of horticulture, S.C. Coastal Experiment Station, Charleston, S.C.

p. Byproduct of hog production.

q. Yields calculated using 1982 statistics from South Carolina Crop Statistics -- 1981-1982.

r. Noncitrus Fruits & Nuts, 1983 Annual Summary, USDA Crop

Reporting Board, FrNt 1-3(84).

s. Collards.

t. Okra.